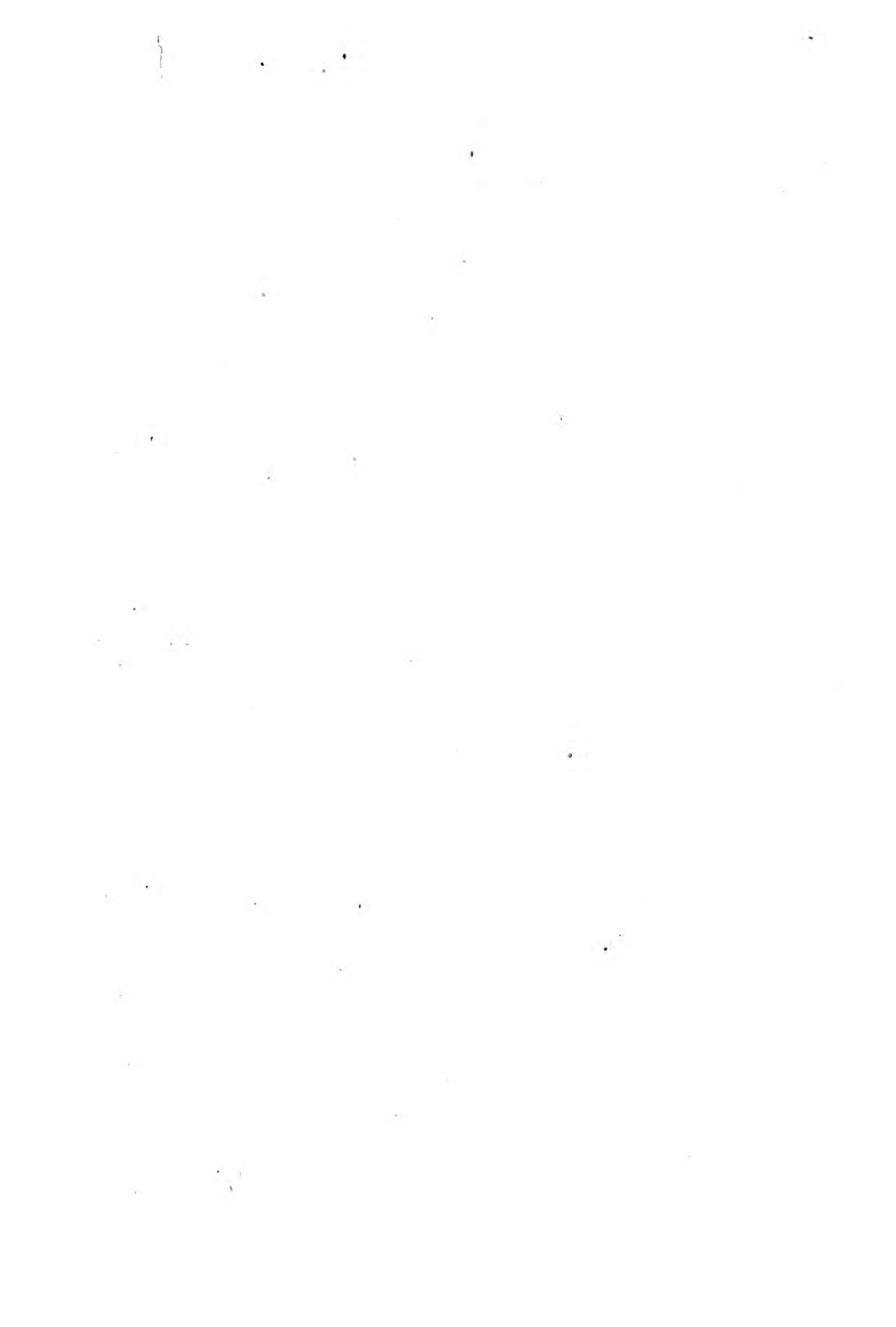




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W. F. ROCHELEAU

AUTHOR OF "GREAT AMERICAN INDUSTRIES," ETC.

FULLY ILLUSTRATED

WITH

LITHOGRAPHS, ENGRAVINGS, AND HISTORICAL, POLITICAL
AND PHYSICAL MAPS

VOLUME I

NEW YORK

CHICAGO

SAN FRANCISCO

DIXON, HANSON & COMPANY

1906

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PREFACE

THIS LIBRARY OF REFERENCE has been published to supply the demands of a progressive and busy age. The rapid advancement made in recent years in every department of knowledge is not shown in books published ten or even five years ago. During these years much has happened to make an entirely new treatment of many subjects necessary; this is particularly true of chemistry, medicine and nearly all other branches of natural science. New inventions and discoveries have sprung into being, such as the automobile, air ship and wireless telegraphy. The uttermost parts of the earth have been explored; the light of civilization has reached the interior of Africa and the most distant isles of the sea, and their history and geography, as well as the foreign relations of the United States, have been essentially modified.

The teacher and the pupil, the general student and the business man, all need close at hand a concise, clear and convenient work of reference. The teacher needs such a work because of the many subjects that come up daily for discussion and investigation in every school room, because of the correlation of these subjects, and because every teacher who would succeed must be a student. The pupil needs it because he wants up-to-date information, because he needs to do much collateral reading in connection with his study of the text-book, because he is naturally inclined to seek useful information for its own sake, and because the information gained from such works adds new meaning to his studies and begets an interest which he will not otherwise have. The reading habit and the spirit of investigation should be firmly established during the school life of the pupil and the opportunity to consult a good reference work is one of the best means of securing this much desired end.

The general student, the business man and the professional man have occasion to consult a reference work almost daily, and frequently several times a day, for a knowledge of the world and its progress in the various departments of learning is essential to their success.

The editors of this LIBRARY OF REFERENCE have endeavored to make a reliable, practical, up-to-date and concise work of reference that is well calculated to meet the demands of all classes who feel the need of such a work. The books are within the mental grasp of all, and easily accessible to those who desire to be well informed on topics of ordinary conversation and to those who are striving for higher intellectual development.

We have treated the more important subjects under a single heading instead of breaking them up into a number of shorter articles. The chief aim in

PREFACE

the arrangement has been to preserve the unity of the subjects treated and to render the work easy of consultation. The various articles have been carefully outlined and subdivided so that by glancing down the sub-headings the reader may easily find the part or parts desired. In no case, however, have the facts been so separated as to lose their mutual relationship.

This LIBRARY OF REFERENCE is pre-eminently an American work and yet world-wide in its scope. The work is not so emphatically American that the treatment of foreign countries is narrow or insufficient for practical reference. The foreign countries recently opened to civilization have been treated at considerable length.

In biography it is most difficult to secure information concerning living men, therefore we have presented the prominent men of to-day, especially Americans, instead of writing the biographies of a great number of men of the past, who, though they may have been prominent in their own times, have left no traces in the history of civilization. We have given only those men of the past whose names are inseparably connected with the world's history.

In commercial progress, scientific research and industrial life, America is given precedence over other nations. The process of making the common objects of every-day use is as interesting as it is mysterious. We present the method of manufacturing over two hundred of the principal articles of commerce, and show the process from the time the raw material goes into the mill, factory or workshop, until it comes out a finished product.

The articles on the States of the American Union have been compiled from information received from the several State governments and from the National Bureau of Statistics. Towns and cities of the United States of 5,000 inhabitants or over are given, with their railroad connections and industries.

This work is under the constant supervision of a competent editorial staff, and embodies the results of the latest achievements along all lines of human progress, as the relations of our country to the other nations; the development of our island possessions; the recent trouble in China; the completion of the Trans-Siberian railway; the status of the Isthmian Canal; Marconi's trans-Atlantic experiments in wireless telegraphy, and many other timely topics.

The volumes are fully illustrated with multi-colored lithographs representing nature study and other subjects; over 200 full-page engravings; 1,700 etchings; a large number of half-tone portraits of eminent men and women; and political and relief maps. The maps are the most recent and authentic published, and show the physical features and political divisions of the world as they exist to-day.

If years of diligent research and almost constant consultation with leading scholars and continual reference to comprehensive libraries can avail anything, the accuracy of the work is not to be questioned.

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CHAPTER I.

OUR OWN COUNTRY.

Two things with reference to our country are very hard to realize: first, that its citizens are a transplanted people and not descended from the people who inhabited Ancient America; second, that it is so very large.

Of all the men who are now voters in the United States, some were born in Europe, many were the children of parents who had emigrated to America, and nearly all were the descendants of ancestors, who, only three centuries ago, were living in what we choose to call by comparison, the Old World. We are really European people transplanted to a new soil, and have grown and prospered until we are the great nation we are. It is extremely rare that we find an American citizen descended from the red men.

Until within four centuries our ancestors in the Old World had never heard of America and had not even dreamed of a country rather thickly inhabited, lying between the western coast and the eastern shores of Asia. Many of us seem to think the history of America began with its discovery by Columbus in 1492, when in fact it had been inhabited for centuries by

a truly great people. Of course, the Europeans coming to this country four hundred years ago thought it was the coast of Asia, and when they found the country peopled with inhabitants different in appearance from themselves, they called them Indians. In this they certainly showed very poor judgment, for the natives of America are not like Asiatics. They are a race by themselves and had lived here many thousand years before this country was discovered. While they all had a reddish skin, little or no beard, straight, black hair, high cheek bones, and coal-black eyes, the different tribes differed from each other in general appearance, size, and customs, as the Abyssinian differs from the German, or the Englishman from the Italian.

These ancient inhabitants, or Indians, were divided into three great classes: 1, the half-civilized; 2, the barbarous; 3, the savage. Some of the first group, the most highly developed of the three classes, still live within the borders of our country, and they certainly are a very interesting people. They have always seemed to choose a chiefly mountainous country as their home, and originally extended

from New Mexico southward, to Chile in South America. This country is so dry that we wonder how these people ever grew crops sufficient to live upon. But upon looking over the country originally inhabited by them we find that these ancient, half-civilized people had somehow, even in the earliest times, hundreds and hundreds of years ago, learned to bring water down from higher up in the mountain ranges by means of channels and small ditches, sufficient to grow their crops of Indian corn successfully. Thus, long before the more highly civilized white man came to this country, *irrigation* was successfully carried on.

This same group of ancient people learned how to build very strong fortresses of *adobe* or sun-dried bricks, and also of well-cut stone. Some of the fortresses were six stories high and would hold over four thousand people. Sometimes these fortresses were extended until they grew together into a city of fortresses to which the name *Pueblo* was given. The half-civilized Indians who live in them are called Pueblo Indians.

By far the most interesting Pueblo Indians are the Zuñis of New Mexico and the Nioquis of Northern Arizona. In old Mexico there were even more of these fortress cities or pueblos, and they were organized into federations, the strongest being that of the *Aztecs*. The Indians who inhabited these pueblos always had a military chief or king. Their utensils, implements, and weapons were usually made of stone though sometimes of a fine quality of *bronze*. They made extensive use of picture writing on bark and on the woven fibers of the century plant which answered the purpose of paper as used to-day. This sort of writing is usually called *hieroglyphic writing*. These half-civilized Indians did not torture people to death as did their barbarous and savage neighbors, but sacrificed them to the

gods they worshiped. Many of these interesting people built their pueblos perched up on high cliffs like eagles' nests and were called *cliff-dwellers*.

The most civilized of all these people were the *Incas* and their principal home was the country of Peru. They used the *llama* as a beast of burden and the *alpaca* for its hairlike fleece, which was woven into cloth. They raised the best of *cotton* and made very fine cotton and wool cloth. They worshiped the sun and were so highly civilized that they did not offer human sacrifices. In America east of the Rocky Mountains we find mounds from which over 50,000 ancient relics have been taken, consisting chiefly of stone axes, hammers, water jugs, grinding tools, and arrow heads. The people who constructed these earthen mounds have been called *mound-builders*.

The second group, or barbarous Indians, who inhabited villages east of the Mississippi River, were the first the white men had to fight, and who played a most conspicuous part in the beginning of the history of our own country. The least advanced of all these tribes were the Chippeways or, as sometimes called, the Ojibways; the most developed were the Iroquois.

The savage Indians lived west of Hudson Bay and in a southwesterly direction, between the Rocky Mountains and the Pacific coast. They included the Apache, Athabasca, and Bannock tribes. They were not settled in villages but moved about from place to place living in rude wigwams. They wove baskets, but did not make pottery.

These facts with reference to the ancient inhabitants of America all show that our country is really, after all, a very old country. But it is still more difficult to realize the tremendous extent of the land we occupy. If one walked twenty miles every day, which would be a pretty good record for most of us, it would

require about five months to walk across our country from one ocean to the other. We have nearly eighty million people in the United States yet there are some portions so thinly settled that we might travel for hundreds of miles and not see a house.

We can only speak of a few of the principal cities in this short article, but this will give us an idea of how different portions of our country are occupied in gaining a living, and how different the people themselves are from one another.

Washington is interesting because it is the home of our President and is the head-city or capital of our country. There are people from all parts of the world living in Washington. They are selected by the governments of other countries to come and live with us at our capital to help keep up friendly relations with their people at home. Most of these foreign representatives bring their families along and so you will always see Japanese, Chinese, Spanish, French, and German children playing in the streets and parks of Washington. The city is full of interesting public buildings of which we are all proud. Among these is the building containing the National Library, the largest library building in the world. The art galleries are full of beautiful pictures, and the parks are larger than many farms and are filled with rare and beautiful plants. It is always interesting to visit the White House, especially on a public reception day when one can meet the President and his wife.

If we go down the river we find Mt. Vernon which was the home of General Washington and where his tomb now is.

In *New York City*, Broadway is the principal street. On this street near the post-office is Trinity Church. It is a very old church and in the cemetery near by may be seen the graves of many famous persons who were among the early settlers of this country. At

the foot of Broadway is Castle Garden, the place where emigrants land on coming from Europe. Riding to the north on the elevated railroad, high above the streets, one soon reaches Central Park which is full of interesting things. Rare plants, a fine collection of minerals, the Art Museum, and the Obelisk are well worth seeing. Boys and girls ride about the park in quaint little goat carts. We ride still farther north along the Hudson River and we soon come to a little hillside in Riverside Park on which is built the tomb of *General Grant*. On the west bank of the Hudson is a high natural wall of rock which we call the Palisades. One should not leave New York without visiting the Brooklyn Bridge, the finest bridge structure in the world.

If we go by boat from New York to Boston, we will, in all probability, land at Newport, where we can see a round tower of stone, solidly built and covered with ivy. It is called the "Old Mill," and was in all probability built by the Norsemen long before Columbus came to this country. It is believed by many that the first ships that came to our country a thousand years or more ago, landed at Newport.

Near Newport is the great factory town of Fall River where many mills are located, all propelled by water power. It is interesting to go through these mills and observe the manufacture of calico, gingham, and woolen goods.

Boston is near by and as we enter the business part of the city we soon discover that its streets are not so wide, straight, broad, and beautiful as those of Washington or New York. In the newer part of the city there are, however, some very beautiful streets. The Public Garden is a delightful place in summer and is full of beautiful shrubbery and flowers. The Boston Common is a large park of over forty acres and is shaded with beautiful old elm trees. The name "Hub" was first ap-

plied to Boston by Oliver Wendell Holmes, in a speech some years ago when he said: "Boston State House is the hub of the Universe."

In Cambridge, a suburb of Boston, is *Harvard University* and near it the home of *Longfellow*, the old Cragie House as it is called. Here the great poet lived and died, and here General Washington once lived for a short time during the Revolutionary War. In Charlestown, another suburb, to the north we can see Bunker Hill Monument, which marks the spot of the battle of Bunker Hill.

One of the narrowest streets in Boston is Washington St., and on this street we find the old state house and the famous Old South Church. Just around the corner we observe a small building on which there is a tablet saying, "This is the house in which Benjamin Franklin was born." It is interesting to walk across the Charlestown bridge along the New York road, the one that *Paul Revere* took on his famous ride.

It is not far from Boston to the shores of the Merrimac River on which Lawrence, Lowell, Manchester, and Concord are located. In these towns on the Merrimac nearly everything you can think of is manufactured—pins, toys, tools, locomotives, machinery, medicines, and miles of cloth are made every day. The farms of New England are not very numerous and the soil is not very rich, hence so many people are engaged in manufacturing, making goods to sell in the West where farms are larger and more productive.

Philadelphia is the largest city in Pennsylvania, and its most famous building is Independence Hall with its old *Liberty Bell*, but Wilkesbarre and Scranton are perhaps even more interesting because they are in the midst of the hard coal and iron region. A coal or iron mine is well worth seeing. Some of the mines are very deep, and it is interesting to see the miners working by the dim light of their

safety lamps. It is but a short ride from Philadelphia to Baltimore, which is a most beautiful city. Here millions of oysters are packed and shipped every year.

Every year thousands of people visit *Buffalo* because of its nearness to *Niagara Falls*. It is a delightful ride to take the electric car from Buffalo to the Falls and then ride for eight or ten miles on the trolley car, close to the edge of the mad Niagara River below the Falls and past the Whirlpool Rapids to Lake Ontario.

As we enter *Chicago* coming from Buffalo, Detroit, or Cleveland, we are quite likely to pass the town of South Chicago, where so many steel rails are made. When one reaches Chicago he will readily find his way to Michigan Avenue and Lake Front Park, in which is the beautiful monument to *Gen. John A. Logan*, and across from this park is to be seen the handsome Auditorium Building with its immense hall. President Harrison was nominated in this building, before its completion. Going northward we come to the Chicago River, near which stands a wholesale grocery house on which is placed a marble tablet saying: "Here stood the old log building, Fort Dearborn." Many people still live who remember when Chicago was a little village, and Indians and trappers were its principal inhabitants. Chicago has no crooked, narrow streets and no hills, as the city is built on perfectly flat ground. Some streets are over twenty miles long, perfectly straight and level their entire length. Every visitor should see South Park, Drexel Boulevard, and Lincoln Park.

In the southland, in Kentucky, we find *Mammoth Cave*, which extends nine miles under ground. It has many rooms, and to go through all of them one would have to walk two hundred miles. In Virginia is the famous Natural Bridge, and farther south we find the

mammoth fields of sugar cane, cotton, and rice, and the beautiful orange groves, while in the great state of Texas we find immense cattle ranches. We fail to realize that Texas is more than four times as large as all the busy New England states put together.

New Orleans is a very interesting city because it is so different from every other city in our country. It is still a very French city, many people still speak the French language, and you also hear Italian and Spanish as well as English. The cemeteries are peculiar because the dead are not buried at all but are placed on top of the ground instead of in graves.

From New Orleans to St. Louis on the *Mississippi River* is a beautiful ride. Our steamboat goes under the wonderful Eads Bridge, one of the finest in the world. Farther up the river is the newer Merchants Bridge. St. Louis has the finest and largest railroad depot in the world. One must not fail to see the many parks, statues, fountains, and the famous botanical gardens, called Shaw's Gardens.

Rushing across the plains to the west, we are pulled up long grades into the beautiful city of Denver, which is a mile higher than any city we have mentioned so far. From every part of the city we have a delightful view of the mountain peaks of the Rockies, one of which is Pike's Peak, with snowy top, and which, though seventy-five miles away, can be plainly seen. Denver is such a new city that none of the old people who now live there were born there, because when they were little children there was no such town as Denver. It is a city of broad, handsome streets and most beautiful residences.

By riding through cañons and over mountain passes we reach Santa Fé, the capital of New Mexico. This is not a fine new city like Denver. It is very old and very interesting on this account. Most of the people here still

speak Spanish. A good many Mexican boys and girls can be seen playing in the streets. Here is an old Spanish church, with an old bell made in Spain hundreds of years ago.

North from Denver a few hundred miles is the *Yellowstone National Park* with its mammoth hot springs, geysers, cascades, and great forests. On the way to San Francisco we pass through Salt Lake City, a very wealthy and beautiful city, situated in fertile plains and surrounded by mountain peaks from which flow the clear melted snow water into the Great Salt Lake.

San Francisco was the first city to use cable cars which were first invented for the purpose of going up and down these steep hills. The buildings are chiefly of wood on account of the earthquakes that sometimes occur here. San Francisco has the largest hotel in the world, and that too, is built of wood. There are many Chinese in San Francisco; - a part of the city is called Chinatown. As one drives to the shore of the ocean, beautiful Golden Gate Park is passed. Here the grass is green and the flowers bloom even in midwinter. The most interesting monument is that built in honor of *Francis Scott Key*, who wrote *The Star Spangled Banner*. Out a little way in the bay we may see hundreds of seals on a group of rocks.

Away to the extreme north is *Alaska*, and it is a much larger country than we are apt to think. You could put in it all of the New England states, together with Texas, California, Illinois, and Ohio, and still have some room left. Few of us stop to think that a trip along the entire coast of Alaska would prove of greater distance than that of all the states on the Pacific, Gulf of Mexico, and Atlantic Ocean put together. There are great quantities of coal and sulphur, also much gold brought from Alaska. Immense quantities of fish and fish products are also shipped. There are sixty

great salmon canneries on the islands and adjacent coast. Millions upon millions of cod are also found in the Alaskan waters. Otter, beaver, and bear are very numerous and the chief business of the natives is that of catching animals for their furs. California cities depend chiefly on Alaska for large supplies of ice and considerable lumber. Nowhere in the world is the scenery more impressive than in this far off northland.

Of course we have been able to mention only a few facts about this great country of ours,

but these may serve to indicate something with reference to the beginning of its history as well as its vastness, and the various occupations of the people living in different localities, due to differences in natural resources, soil, climate, and other influences. But with all these differences of ancestry and surrounding conditions, we are really one people, living under the same flag, and as true American citizens are desirous that it shall in all respects become a country so great that all the nations of the earth will recognize its superiority.

CHAPTER II.

OUR NEAR NEIGHBORS.

Two or three centuries ago the very wisest men knew even less about geography than the school-boy of ten years knows to-day. A little more than 300 years ago the ambitious king of France was anxious to find a new route to India that would be shorter than by the way of Cape of Good Hope. To this end he gave three new and excellent vessels to *Jacques Cartier*, a fearless navigator, and requested him to follow the River St. Lawrence, whose entrance he had discovered a few months before, and if possible reach India by this route. It will be remembered that the James and Hudson rivers were also regarded as routes to India and this led to their early exploration also.

Cartier crossed the Atlantic, and after many severe and trying experiences, sailed on and up the mighty St. Lawrence. After going for 300 miles, he came with his vessels to a great rock, jutting out into the river, and toward this rock there extended a bluff from an opposite shore, making the river no more than three fourths of a mile wide.

Cartier must have seen into the future for he seemed to realize the importance of this rock as the most commanding point on the

river. He gave up his dreams of the yellow gold and pearls of India and laid claim to the spot in the name of the King of France.

Fifty years after this *Champlain* founded on this very spot the city of Quebec. He won all the Indians but the Iroquois for his friends. His treaties with the Indians were never broken. He was a very religious man, and the influence of the French over the Indians was made much stronger by the arrival of the Jesuit priests. Champlain from the first made Quebec an intensely religious city, and to this day there are still in Quebec five times as many churches as are needed for the population.

It is not necessary to repeat the story of the French and Indian wars with the English settlers of the colonies and how after five unsuccessful assaults on Quebec it finally fell into the hands of the English and how both leaders, Wolfe and Montcalm, were slain in that terrible battle on the Heights of Abraham.

Although belonging to the English, Quebec is still thoroughly French in its appearance. Every traveler who visits it is reminded of the castles and cathedrals of France, for Quebec

certainly appears like the French cities of the seventeenth century. Without question the strongest fort in the Old World is on the rock of Gibraltar. Because of the advantages of Quebec from a military point of view, it is called the Gibraltar of America. In looking at the strong walls you will at one place notice a feather carved in the rock. It is related that once, when on a visit to this country, the Prince of Wales was reviewing the troops and examining the fort, a feather fell from his cap and touched this very spot. To preserve this in memory an officer carved this feather in the rock. This indicates a strong feeling of loyalty of *Canada* to England.

Quebec is full of convents, the first ones being erected to afford the nuns an opportunity to convert the Indian girls, but now they are used as schools. It was in the Ursuline Convent that Montcalm died and his skull is kept as a relic by the Ursuline nuns. On the wall is a tablet bearing in French the words, "Honor to Montcalm." In the park-like plains of Abraham we may see a beautiful monument with this simple inscription, "Here fell Wolfe victorious."

At the extreme eastern end of Canada is Newfoundland, often called the province of fishermen, because the majority of its people are engaged in catching and preparing fish and fish products for market. There are two distinct classes of fishermen, the shore fishermen, and the deep-sea fishermen. The latter look down on the former because the shore fishermen are not nearly so skillful, meet so little danger, and have such an easy time as compared with the hardships they themselves endure. The deep-sea fishermen fish for cod and halibut at the distant banks of Newfoundland, which are shallow places in the ocean formed by upheavals of the sea bottom, the filling in of sediment, little fine particles of mud from the Gulf of Mexico carried in solu-

tion and deposited by the icy Arctic current and the warm Gulf stream coming together. Also the icebergs carried southward by the Arctic current are full of frozen earth. The warm water of the Gulf stream melts them and the earth and stone of the iceberg sink to the bottom of the sea gradually filling in the low places until the Newfoundland banks were formed. Because the water is so shallow, mussels, clams, oysters, jellyfish, starfish, all come here to make their home, and they in turn attract the cod and halibut in large numbers.

The two great ocean currents by coming together produce dense fogs that rise very suddenly without a moment's warning, followed by terrible storms and gales that make this part of the ocean greatly dreaded. When a fishing schooner reaches the banks no time can be lost in setting to work, for the bait will not keep fresh for more than twelve or fifteen days. After this the fish will refuse it. Each man keeps count of the fish he catches by cutting out the tongues which are counted by the captain or skipper, as he is called, who records the number so that each may receive his due share of the profits. Each vessel tries to gain for itself the record of the greatest number of fish caught. One vessel in eighteen weeks achieved the record of 900,000 fish which sold for \$26,500, making after the expenses were deducted, the profits for each of the men of the vessel who had suffered untold risks and endured many hardships, about \$325.

Let us now get a glimpse of that vast region between the Ottawa River on the east to the plains of *Manitoba* on the west. This is the great forest region of Canada. Fifty years ago it was wholly unexplored. To-day it is the scene of the busy and active life of the lumbermen whose days are almost as monotonous, as perilous, and as pleasureless as those of the fishermen of Newfoundland.

This great forest domain is divided into timber limits each ten miles square. Valuation is placed upon these and they are leased to the lumbermen for a certain sum of money per year, which is paid to the government. In addition, a duty or tax is paid on every log that is cut. The first thing is the erection of a shanty for the lumbermen and a stable for horses and oxen. The cracks are stuffed with moss and hay to provide against the terrible cold of the coming winter. Next, by the side of a river or lake, a rollway is prepared by which the logs will be piled until the spring freshet, when they will be rafted down to the sawmills. When the logs are landed at the rollway they are given two marks or brands, one indicating their owner, the other their value. When the logs are launched in the spring they are followed by the lumbermen in a flat-bottomed boat to their final destination, the sawmill. These mills are usually run by steam and the sawdust is used as fuel in the monster furnaces under the boilers. About one half of the lumber is exported to Great Britain. For several years twenty million dollars' worth of lumber have been taken out of the Canadian forests annually. These lumbermen are the pioneers of a future civilization. Where their shanties now stand may in the near future be a flourishing town or even a large city. Farmers find a good market for their produce at the lumbering camps. They clear farms near by, and are soon joined by blacksmiths, carpenters, shoemakers, and merchants, and thus a new settlement is begun.

The Canadian country west of the Rocky Mountains is very new. Not many years ago the news spread like wildfire that on the banks of the Fraser River there were vast deposits of gold. The most significant result was the settlement of the country. Farmers came not to seek gold but to raise food for the vast army

of miners, and by means of irrigation have made this section of the country famous as an agricultural region. Victoria is the capital and chief city of British Columbia and is thoroughly English. The laborers in *British Columbia* are chiefly Indians, just as the negroes are in the South, serving as farm hands, lumber drivers, longshoremen on the docks, sailors, teamsters, and coachmen. Many Chinese are employed as house servants. The Indians in the northwest are chiefly members of the *Flathead Tribe*, so named because each Indian's forehead is flattened by his parents' strapping a board across the front of the skull in infancy. These Indians live in long, flat huts instead of in wigwams. Their chief food consists of dried clams and smoked fish.

Montreal is the largest and most interesting city of all Canada. It is called the island city because it is built on one of the largest islands of the St. Lawrence. To reach it by river one must go through the perilous rapids, the most dangerous of which are called the Lachine Rapids. If the Indian pilot should turn his eyes but once the vessel would be destroyed on the sharp, jagged rocks. At Montreal is the famous Victoria Bridge a mile and three quarters in length, and is really an iron tube or box with solid sides. It is 22 feet high and 16 feet wide. It is used only by railroad trains. A beautiful view is gained from Mount Royal, from which, by the way, the name of the city *Montreal* was derived. On the top of this mountain is probably the finest park in this country. It cost three million dollars. On the same mountain are immense quarries from which the building stone of the city is taken. The wharves of Montreal are so immense as to be next to those of Liverpool in size. The freight sheds and other structures on the docks are all movable on account of the sudden freshets when the ice breaks and gorges in the river in the spring.

The city is divided into French and English quarters located at the east and west ends of the city, and there is a spirit of sharp rivalry between the two. Many of the cathedral churches are like the old churches in the north of France. With the exception of the single cathedral in Mexico, Montreal has the largest church on the American Continent. It is called Notre Dame, being patterned after the cathedral of the same name in France, and can accommodate 16,000 persons. There are many monasteries and convents for the care of the infirm, poor, and the aged, and for the education of the children.

There is a marked foreign and thoroughly un-American air about Montreal. In the French quarter the streets are very narrow like those of the towns in Normandy. The English quarter is very modern because its people are more enterprising and see great possibilities in the development of this city. The Ice Carnival in winter is a great event. The Ice Palace, built in Dominion Square, is constructed entirely of snow and ice frozen into a solid mass. It is a dazzling sight in the sun by day and when illuminated by electricity at night. Snow-shoeing is one of the chief sports during the long Canadian winter. The snowshoe is really a necessity in getting over the dry mealy, deep snow, and was first invented by the Indians.

But interesting as the Canadian country is we must now turn to the quaint country south of us. *Mexico* is so different that we can scarcely realize that it is such a near neighbor. In the United States people are glad to have a railroad built in their midst so as to develop their part of the country, but in Mexico the common people have from the first opposed railroad building. They even prayed to their gods to protect them against the coming of the "iron horse." At one town they placed their great stone idol on the track, its face turned

toward the fast approaching train, believing that they would thus destroy their dreaded foe, and with shouts and songs they waited to see the engine broken to pieces. But to their consternation the train went by without the slightest damage to itself, while the idol was shattered and the fragments strewn along the track.

One writer has said that "Mexico has a backbone of silver with ribs of gold." Mining of the precious metals has certainly been one of the great sources of wealth since their accidental discovery by a group of convicts fleeing from justice. In a secluded spot on the mountain side they had made a camp-fire upon the rocks and this fire so heated the rocks that white veins of silver plainly showed. They boldly went to the government and told of their discoveries, were pardoned and became very wealthy. Much of the silver is found mixed with clay, and the clay is tramped upon by Indians and mules week after week in the most tedious and tiresome manner just as it was 300 years ago. It has been impossible to use steam power because of the opposition of the people. Some of the veins of silver are so deep and run so far into the sides of the mountains that it takes three hours to get into the mine and three to come out, so that only six hours is left for actual work. This is quite common near Guanojuato. In this city the street-car is drawn by mules, the driver always being provided with a fish-horn with which to warn people off the track. The farmers in this part of the country have their fields fenced off with the organ pipe cactus which really makes a better fence than the ordinary hedge used in many portions of the United States.

The city of Mexico is built in the form of a square, about four miles each way. The streets are run from east to west and from north to south, and are very straight. From any high point near by the city looks like an

immense checkerboard, so regularly is it laid out. The people differ somewhat from those seen in the country districts. Only a few of the women wear the "reboza," using instead a sort of Spanish lace scarf with which to cover a portion of the face.

On the edge of the Grand Plaza we find the great cathedral and the National Palace and government buildings. The cathedral is the largest church on the American Continent and is built in the form of a Greek cross. It took over one hundred years to build it, the bare walls alone costing over two million dollars. Just outside the church are found many fragments of curiously carved stone, taken from the bloody altar of Huitzelpolzi, erected by the Aztecs and first found by the Spanish explorer Cortez nearly 400 years ago. Thousands upon thousands of captives were offered in bloody sacrifice on this heathen altar. In the National Museum is found the Calendar Stone of the Aztecs, covered with characters so strange as to completely baffle the learned men who have tried to decipher them.

The flowers found in the Mexican gardens are much larger and more richly colored than those of our own country. *Calla* lilies grow wild in the ditches by the roadside, and geraniums attain the height of eight feet.

Three miles from the city of Mexico is the old castle of Chapultepec, a portion of which is the summer residence of the president, and in another portion is the military school for boys, something like our own academy at West Point. There is a monument erected on the high rocky grounds of this imposing castle, to the memory of the cadets who fell while bravely fighting the U. S. troops during the Mexican War, a battle occurring at the very foot of the castle. *Mount Popocatepetl* can be plainly seen from here as it projects its volcanic summit into the clouds.

The reason so many of the natives are so

dirty-looking is because of the scarcity of water in this dry country. One must either go a long way to the public fountain and wait sometimes for hours for a chance to fill his water jar, or he must buy it from the water carrier, who goes from house to house and is clad entirely in leather. The poorer Mexican cannot afford to buy water, so he goes dirty. But wherever water is free and plentiful, as in such cities as Calientes or Aguas, there we find the natives very cleanly. Ice is purchased from the Indians, who bring it from the snow-clad summits of the mountains.

It is very difficult for a stranger to accustom himself to the Mexican markets. There are no stores similar to ours. You cannot buy a broom except from the traveling peddler who makes and sells them, and his visits are often few and far between. The first-class horse cars are painted yellow, and the second-class are painted green. A cab has either a red, a white, or a blue flag to denote whether it is first, second, or third class. To ride in a third-class cab costs only half as much as in a first-class one. Small donkeys or burros are much used to carry heavy loads of wood, hay, or water. So large are some of the loads that you can see only his hoofs and the tips of his long ears as he goes down the road ahead of you.

In the lowlands of Mexico it is exceedingly hot. Here we find maguey in abundance. This plant is what we call the century plant in the United States. From it is made *pulque*, a very mildly intoxicating liquor, which is drunk as frequently by the natives as milk is in this country. It takes seven years for the maguey plant to attain full size and each plant is then worth about fifteen dollars. Each one of the plants yields about six quarts of sap per day. This sap is sweetish and is called "honey-water" before it is fermented. It requires about fifteen days for it to be fermented into pulque. Pulque is such a favorite drink that

people of the city of Mexico alone use about 15,000 barrels every day. But in spite of this, very few people indeed are seen intoxicated, for the saloons, or pulque shops, are closed by law at six o'clock in the evening and the drunken go home and sleep off the effects, instead of carousing on the streets until late into the night. The maguey plant furnishes food, shelter, and fire. The roots are boiled for food; the leaves, when spread out and dried, are used to shingle the houses; the stalks are used as fuel. Sometimes the fresh leaves are cut into troughs into which water is poured and thus frozen into ice, for the oil evaporating so rapidly from the cut leaves cools the water down to the freezing point, somewhat on the same principle as that of the modern ice-machine. The fibers of the plant are shredded and woven into cloth, twine, and a fine quality of rope, or braided into mats. From the prickly thorns of the plant, nails and needles are made. The thorns are sometimes torn from the leaf in such a way as to have a long slender fiber attached to them, and so the needle is already threaded. The large white caterpillar that lives on the plant is cooked for food and is regarded as a great delicacy. The maguey plant is as useful to the Mexican as is the *date-palm* to the Arab, or the *cocoa* to the South Sea Islander.

Puebla is in all probability the most important manufacturing town of Mexico. Thread, cotton cloth, blankets, shawls, crockery, glass, matches, and soap are all made here. The city is built of granite. Near the city are great mountains of the beautiful marble stone called Mexican *onyx*. It is one of the cleanest cities in the world and is called the "City of Angels."

The pyramid of *Cholula*, a relic of the days of the Toltecs, is seven miles from *Puebla*. It was built by captives taken in war. From this pyramid a better view is had of the distant *Popocatepetl* than that had in the city of Mexico itself. The volcano *Orizaba* is also plainly visible.

Vera Cruz is in the midst of the hot region and here the thermometer registers as high as 125 or 135 degrees. The air is very damp. These lowlands are covered with long banana, mango, pepper, and fragrant rose trees. The country roundabout is filled with large coffee plantations. If the Mexicans were more careful in drying and sorting the coffee bean and preparing it for market, it would be equal to the best Java, Mocha, or Maracaibo coffee. Yellow fever or "yellow jack" is quite prevalent during the winter and spring, and on this account many travelers evade the lowlands in journeying through Mexico.

CHAPTER III.

A FEW GLIMPSES OF EUROPEAN LIFE.

Every one of us as a child has read the tales of *Hans Christian Andersen*, the great story-teller, born in Denmark in 1805. How interested all the children are in the stories, "The Ugly Duckling," "The Top and Ball," or "The Little Match Girl." A child who has not heard or read some of these stories has certainly been sadly neglected indeed. The land of Hans Christian Andersen is a very interesting little country and the chief city is Copenhagen, which means "merchants' haven." It is certainly a city of merchants and merchant vessels. Danish butter is famous all over Europe for its sweetness and freshness. This is because it is so packed as to exclude the air, a process which dealers in other countries have tried to learn without success. A great number of the spirited horses used in the German army are raised in *Denmark*. Some are imported into the United States. The country is remarkably flat, the drainage is therefore poor, so that cholera or similar scourges are at times prevalent. Copenhagen was the home of *Bertel Thorwaldsen*, who as a sculptor ranked next to *Michael Angelo*. He and Andersen were intimate friends. Thor-

waldsen Museum is a worthy monument to the great artist.

The Danes, as well as the Norwegians and Swedes are a well-educated and very enterprising people, and are very polite. It seems queer to us to see the men salute and kiss each other on the streets. Nearly every one wears gloves which are very cheap, costing about thirty-five cents a pair. The Danish people are very fond of amusements, being of a lively disposition, much like the French of Paris. They take great pleasure in the theater, dancing, and cards.

At Elsinore in the extreme north is the Castle of Kronberg, which was the house of "Hamlet," Prince of Denmark, the famous character in one of the great plays of Shakespeare. The guide in showing visitors through the castle even points out the place where Hamlet met the ghost of his murdered father.

Leaving Denmark we find the walled country of *Holland* that has been reclaimed foot by foot from the raging North Sea. Holland is the cleanest country in the world. The houses are always brightly painted in red, green, yellow, or Dutch blue, and are roofed with brick-

colored tiles. They are frequently scrubbed from the eaves to the foundation stones and are so clean and bright after such a "bath" as to be quite dazzling. The whole country is dotted with windmills that are used to pump water, grind grain, crush stone, and saw wood. The Hollander smokes a *meerschaum* pipe almost constantly. Some of them really sleep with their pipes in their mouths. As one Dutchman put it, "Smoke is our second breath."

In winter every Hollander, young and old, skates on the many frozen canals or home-made rivers which traverse the country. You will see the old woman with a large, heavy basket on her head skating to market. The doctor skates to the residence of his patient, the tradesman to his place of business, and children to their school. Ice boats are used to convey loads of hay and wood; having large sails they are propelled by the wind. There are also "push-chairs" mounted on runners and pushed about by servants on skates. Every lady has her elegant push-chair with luxurious cushions and lap robes, while her feet are kept warm by means of a foot-stove, which is simply a box filled with hot coals. In winter these foot-stoves are placed in every pew or row of seats in the churches and theaters by the janitor, who receives a penny for each stove.

Amsterdam is the most important city of Holland. It is so low that many of the houses are built on piles. Some of the streets are so narrow that people in the upper rooms of their houses can shake hands across the street below. Amsterdam is celebrated as being the best place in the world for diamond cutting. The famous Kohinoor diamond was cut here. In *Zaandam* the traveler is shown the house in which *Peter the Great* lived in disguise while studying ship-building. *Haarlem*, which is ten miles from Amsterdam, has an interesting

history. It grew up around a castle and, in the thirteenth century obtaining municipal rights, rapidly developed into an important city. It took a prominent part in the revolt of the Netherlands, was captured by the Spanish in 1527 under the famous Fernando Alvarez Alva, and remained under their rule until 1577, when it again became a part of the Netherlands. From very early times the city has been noted for the cultivation of flowers, sending bulbs to many European countries. The great church organ in the St. Barons Church in *Haarlem* has been played upon by both *Handel* and *Mozart*. Just outside of this church is the statue of *Lorenz Jansen*, who, the Dutch claim, invented the art of printing. Just as he was about to reveal to the world his great invention, it is said the blocks were stolen by a brother of *Gutenberg*, whom the Germans claim as the inventor.

The Hollanders like many other nations of Northern Europe believe that the stork brings good luck. On many low cottages you will see placed old cartwheels, which are supposed to be the favorite foundation of the stork on which to build a nest. These cartwheels are placed there to induce the stork to build, and thus bring good luck to the household.

Leyden is famous as being the retreat of the *Pilgrim Fathers* who fled to Holland when persecuted in England three hundred years ago. During the war between the Spaniards and Hollanders, the people of *Leyden* succeeded in driving away the enemy by cutting the dikes. As a reward for their brave defense, *William the Silent* offered to release them forever from their taxes, but the people said they preferred a university. That is how *Leyden University* came to be founded.

Let us now take a glimpse of the peasant life of Germany. In the southern part of Germany we find the Black Forest which in places is so dark and gloomy that the sun's rays cannot enter. Many of the German legends of

goblins, giants, witches, and fairies are naturally associated with this weird region. The peasants of the Black Forest, both men and women, work on their small farms during the summer. In the winter they cut wood in the Black Forest. These wood choppers have invented most of the mythical tales and ghost stories of the Black Forest. The people spend much of their time in wood carving, and they do this with great skill. Not only do they carve many quaint toys, but they also make beautiful wooden clocks that are famous the world over. Many of the women help to fill the family stocking with pennies by plaiting straw bonnets to be sold in the markets at Nuremberg, Freiburg, or Munich. The common birds of the woods are caught and caged by the peasants, and with much pains trained by them to sing in imitation of the violin music which is an essential feature of every Black Forest home. Day after day these bird lessons are given, and when they thoroughly learn their lessons they are sold in the neighboring city.

In Tyrol the young men are mostly hunters while the girls tend the flocks. The principal game is the hare, chamois, grouse, and an occasional deer that breaks out of the Royal Game preserves. The girls during the summer, while watching the cattle, live in a little hut or *châlet* at the top of the *Alps*. Great heavy stones are placed on the roof to keep them from being carried away by storms. In the early twilight of the evening it is interesting as you look at the beautiful mountains and valleys to hear the shepherd girls jodeling in quaint rhythm in response to a similar call from a more or less distant *châlet*. On Saturday evenings they group together and have dances on the short green grass to the tune of the zither or flute. It is a gay looking company, the girls being dressed in bright colors, while the young hunter who comes to join in the festivities has on his green jacket with

large silver buttons and short knickerbocker trousers, and a hat with the inevitable tuft of grouse feathers or chamois beard fastened to its crown.

These peasants are earnest Roman Catholics. The small Bavarian village of Ober-Ammergau has become famous on account of the *Passion Play*, a religious festival held there every ten years. A sore plague once smote the village. The peasants entered a vow that they would act out the sufferings and death of Christ every ten years, if the visitation of the plague would only be removed. Their prayer was favorably answered and the peasants still keep their word. People from all over the globe come to witness these solemn exercises and devotions.

Let us now notice the very different country of *Spain*. It seems like a piece of Africa that had been given to Europe by mistake, it is so different from all the rest of Europe. Its homes are different, its people are different, its history is different. More than a thousand years ago the Saracens or Moors crossed from Africa to *Gibraltar*, conquered the Christians of Spain and settled there. They built their cities in the Oriental style of architecture and erected mosques or chapels to Allah, the god of the Mohammedans. Europe owes much to the Moors, for they preserved learning during the *Dark Ages*.

Just before the discovery of America, the Christians, who had scattered in the north of Spain, opened war on the Moors for the possession of Spain. Castle after castle was captured by the united forces of the Christians and at last the only city left to the Moors, *Granada*, fell, and the beautiful *Alhambra*, the celebrated Moorish palace, fell into the hands of the enemy, and Ferdinand and Isabella rode into Granada as King and Queen of Spain.

All Spanish cities are literally filled with

beggars. Even strong, able-bodied men are licensed by the government to beg and are the most disagreeable feature of Spain. They are found in front of all the cathedrals and hotels where visitors, whom they waylay, torment, and curse, are apt to pass. They are a most insolent lot and are a burning disgrace to the country.

The water-carrier is as common in Spain as in Mexican cities. Few homes in the cities even are supplied with water. The water-carrier straps his jars on a donkey or uses a wheelbarrow and goes to the fountains. When the jars are filled he goes from house to house selling his supply. The poorer people carry their own water from the mouth of the aqueduct, but the richer people pay from 25 to 50 cents a month for the service rendered by the water-carrier. The daily supply of milk is obtained from goats driven from house to house and are milked "to order" by the servants of each house, according to the needs of the household for the day. Certainly the milk ought to be fresh and unwatered. The streets are also filled with fruit venders, who are either young girls or old men, who have failed to secure a beggar's license. At Christmas-tide this crowd is made larger by the advent of the gypsy girls, who sell roasted chestnuts, and the turkey dealers. The turkeys are driven alive to the market and are whipped into line by the owner who drives them just as an American farmer would drive hogs or cattle.

Near *Cordova* there are many olive orchards which are a source of much wealth. The orchards must be closely watched because of thieves who wait outside with their donkeys to steal the fruit if opportunity is afforded. Cock fights and bull fights are the principal amusement of the Spanish people. They are as popular as ever, and ladies and gentlemen of high position in society are regular attendants upon this bloodthirsty sport. The Span-

ish bull fight is an outgrowth of the old time Roman gladiatorial contests.

Madrid, the capital city of Spain, is made beautiful by fine parks, gardens, and carriage drives. It is celebrated for its famous art gallery, and its museum containing large collections of Moorish and Christian weapons.

Cadiz is literally a snow white city built on a narrow peninsula running into the sea, on which there are many salt marshes. The water is evaporated, the salt is heaped up in huge piles, and shipped to various portions of Europe and Africa.

The most historic part of Europe is that along the *Rhine*. The history of the Rhine country is really the history of Europe. Cæsar fought on its banks, the Goths and Huns here fought each other and the more civilized people of their time, and on these banks occurred the fierce contests of Napoleon during the late Franco-Prussian War. Every cliff, every castle, every town along the Rhine has a wonderful story to tell. According to legend, at the gloomy Drachenfels, Siegfried slew the dragon, while on the Lorelei sat the lovely Siren combing her golden hair and luring sailors to destruction with her songs. At *Bingen* Drusus, the Roman general, bridged the Rhine and built a castle in 13 B.C. *Strasburg*, at the southern end of the Rhineland, is famous for its cathedral. It contains the wonderful Strasburg clock. The spire of the Strasburg Cathedral is the tallest in Europe.

About seventy miles farther north is *Heidelberg*, a most charming university town. The famous Heidelberg Castle is on the summit of the hill and beautiful vineyards fill the valleys. Heidelberg Castle is the finest ruin in Europe, excepting possibly the Alhambra in Spain. In its olden days it was both a palace and a fort. It was many times besieged, and twice surrendered to the French. In one of the cellars is the huge Heidelberg tierce. It

is a gigantic wine cask capable of holding eight hundred hogsheads of wine. When the French captured the castle they thought the tierce was full of wine and made many unsuccessful attempts to open it. Hatchet marks are still plainly visible on its sides.

At all hours of the day many students of the university, wearing queer looking caps, can be seen on the streets. Many of the students have revolting scars gained in sword duels. There is an inn near the town where the people meet and drink and still have their sword duels.

At Mainz we find a tower to Gutenberg, the supposed inventor of printing, and soon we come to Bingen, "Fair Bingen on the Rhine," with its celebrated "Mouse Tower," which reminds one of the old story connected therewith. Farther down on the Rhine we come to the *Lorelei*, and the dangerous whirlpool with its many echoes. Still farther down we come to Drachenfels or Dragon's Height. Once it is said a dragon lived up the side of the mountain. Siefried, the brave German, is said to have slain it here after a terrible conflict. The blood of the dragon soaked into the soil and to this day the grapes grown on this hill are blood red instead of white as those of most of the Rhine vineyards. *Bonn*, a few miles below, is the birthplace of *Beethoven* and also the seat of a great university. Next comes *Cologne* with its great cathedral begun 500 years ago. Among the precious relics of the cathedral are the bones of the three wise men who came to worship Christ. St. Ursula's Church is also in Cologne. Before her marriage St. Ursula, accompanied by 10,000 maidens, is said to have taken a trip to Rome. On her return, she with all her attendants were slain by an army of Huns, near Cologne. The bones were collected and placed in this church and they make a ghastly sight.

Space will not permit us to speak of the

queer people of Lapland and Finland on the extreme north, sunny Italy, Greece, and Mohammedan Turkey on the south, or the largest country in the world, Russia. We have simply endeavored to give the reader a picture of a few of the interesting spots on the continent of Europe.

Berlin, Dresden, and Hamburg are familiar to all readers, as the wealthiest cities of Germany,—*Berlin*, the capital of the federated German Empire, *Dresden*, the great art center, and *Hamburg*, the greatest commercial city on the continent. At Berlin are the castles, the large university with its 7,000 students, the many museums and libraries, statues to the great characters who have made German history from *Frederick the Great* to *William II.* At Dresden is the celebrated art gallery greater than that of Paris or Madrid. The most prized picture is the wonderful *Sistine Madonna* of *Raphael*. The government of Saxony has refused one million dollars for this peerless painting.

Paris the Beautiful is a delightful rendezvous for every traveler. So many Americans visit it that we are quite familiar with it. Its scrupulously clean streets are admired by all. They are kept clean by money raised from taxing signs, lanterns, balconies, and window glass in the houses. All telephone and telegraph wires are underground and not permitted to mar the beauty of the streets. The *Louvre* is famous because of the statues and paintings it contains. The most celebrated statue is that of *Venus de Milo*. Here you find paintings by *Raphael*, *Ruben*, *Vandyck*, and others. At the *Luxembourg* only paintings of living artists are exhibited. In Paris can be seen the obelisk of *Luxor*, brought from the ruins of the ancient city of *Thebes* in *Egypt*. In *Place de la Concord* the guillotine was set up. Here *Louis XVI*, *Madame Roland*, and *Marie Antoinette* gave up their lives. *Lavoisier*, the

great chemist, was also executed here, as well as Danton and Robespierre, the revolutionists. The Vendome Column has an interesting history and really tells of the changes of the last hundred years. In fact, every inch of Paris is historic, as we have seen. The same is true with reference to other parts of Europe, the land from which nearly all our ancestors have come, and to which we are really drawn by very strong ties.

CHAPTER IV.

THE OLDEST CONTINENT.

Asia affords the most interesting opportunity for study of all the continents. Ancient civilization grew here to a high degree of perfection while the world was yet young. Here and in Egypt the first steps in the progress of the world's development were really taken. The variety of its people, their peculiar customs, their high mental and moral development must impress every one with broadened views of the world. It is fortunate for us Americans that so much was achieved in Asia a thousand years ago, for the greatness of our country lies chiefly in the fact that we are the heir of all the years past, and have had the advantage of all the thought and action of centuries, a capital upon which to begin our national life.

Not the least interesting of Asiatic countries is *China*. Canton is the great city of Southern China. It is surrounded by great rice fields on all sides but one. On the river in front of the city are boats of every description, chief of which are the houseboats on which 100,000 men, women, and children live the year round. In these houseboats the various members of the family work at their trades. The children playing on these houseboats have ropes fast-

ened about their waists and when they fall into the river the mothers easily rescue them. Like most Eastern cities, Canton is surrounded with high walls. In the narrow workshops on the filthy streets you can see people engaged in making paper umbrellas, Chinese lanterns, fans, ivory ornaments, and weaving silk. One street is usually given to a single trade; for example, the working and selling of *jade*, the diamond or precious stone of the Chinese. It has been known for nearly 3,000 years and is regarded as the emblem of many virtues. A necklace of rich, dark-green jade beads will cost \$6,000. The dirtiest and most uninviting streets bear very enchanting names. You find them called by such names as "Everlasting Love," "Eternal Joy," "Refreshing Breezes," "Peaceful Rest," and such ridiculous names as "One Hundred Grandsons." There are no shop windows, for the entire front of the shop is open.

More than 400 years ago *printing* was invented in China and yet there are scarcely more than a dozen newspapers and not a single school or educational journal published in the whole country.

The religions of China are an interesting feature. *Confucius* is really the patron saint of China and he was indeed a great man of master mind. He lived 500 years before Christ and his name is sacred to all true Chinamen. *Buddha* is worshiped by a great mass of people. Then there are the household gods which are mere ancestral tablets set in the walls and are worshiped daily.

There are many curious customs prevalent in China. When two friends meet each shakes hands with himself instead of with each other as we would do. We would remove our hat as a mark of regard but the Chinaman keeps his on for the same purpose. Women never go shopping in China. The merchant carries the goods to the house where purchases may be made. Under no circumstances will a Chinese gentleman ride in the same carriage with his wife. Only the very aged men ever think of carrying a cane or walking stick.

The laws of China are rigorous. Even dress is regulated by decree. If it is officially announced that the emperor has put on his summer hat every official must also lay off his winter garb no matter if he is in the extreme north where summer clothing is still made extremely uncomfortable by the cold weather. Very little traveling can be done in the interior of China because of the intense hatred of the people for foreigners, since losing so much by the aggression of foreign powers, and also because of the utter absence of anything like hotels or inns. There are some few telegraph lines in China, but they were at first pulled down by the infuriated natives. By proclaiming terrible punishments for the offenders, Li Hung Chang succeeded in preventing further damage. *Li Hung Chang* is the most distinguished man in China and was for years the warm personal friend of our own *General Grant*. *Pekin* is without doubt the oldest city in China. It is so old that no

record goes back to the time of its foundation. It is generally believed to have existed even at the time when the Israelites crossed the Red Sea. One part of *Pekin* is called the "Forbidden City," where the emperor lives, and which but very few people are permitted to enter. The soldiers who captured *Pekin* in 1900 were the first foreigners to enter the "Forbidden City." Another portion is called the "Tartar City," and is occupied by the nobility and soldiers. The remaining part of the city is for the common people and foreigners, and is designated "Chinese City."

In *Pekin* is the great examination hall where every three years young men are examined for high positions in government service in all parts of the empire. Each student is put into a little stall or cell where he writes for three days the essays and poems that constitute his examination. With him into his cell he takes a little stove on which to make his tea, and sufficient food to last during the examination. What would the average high school boy in America think of this? Every traveler is interested in the Great Wall of China which has rightly been called one of the wonders of the world. The three chief products of China are *tea*, *silk*, and *bamboo*. *Bamboo* is put to an endless variety of uses. From it is made everything from a pencil-box to a house, buckets, chairs, fish rods, musical instruments, bird cages, bellows for blowing the fire, fans, measuring cups, chop-sticks, etc.

The tea trade is one of the great sources of income for the Chinese people and gives employment to a large number of laborers. Dutch traders learned the habit of drinking tea from the Chinese and taught it to the Western world.

Rearing of silkworms is probably the oldest industry of China. The "cocoon festival" is one of the great events of the Chinese year. Legend says that in olden time the empress

discovered the use of the silkworms, and so they style her the "Goddess of the Silkworm."

Japan, the Sunrise Kingdom or Chrysanthemum Empire, as it is often called, is a more progressive country than China. Though shut off from the rest of the world, the Japanese developed a civilization far in advance of that of the Chinese, Hindus, and other Oriental people. It is regarded as the most interesting country in the world. Until 1854, when Commodore Perry negotiated a treaty with Japan, little was known of this charming country. Japan is made up of islands dotted with high mountains and volcanoes, and is frequented by earthquakes. The country is as large as the coast line from Newfoundland to Florida. Less than one eighth of the land is cultivated. Yokchama, with its fine harbor is the Liverpool of Japan. From here a good view of the sacred mountain of Fujiyama can be obtained—a mountain dear to every loyal Japanese. One of the chief means of travel is the "jinrikisha." Commodore Perry took to Japan, as a present from the President of the United States, a perfectly working toy locomotive and a miniature telegraph line. As a result, much interest was aroused, and to-day railroad and telegraph lines are quite common in Japan. *Tokio* is the great educational and political center. Here are located the Imperial University and the palace of the Mikado.

No product of Japanese art is more beautiful than its lacquered ware. *Lacquer* is derived from the tree of the same name by a secret process. A Japanese may own many fine pictures but only one is hung up in his room at a time. The gardens are beautiful and the chrysanthemum is abundant, it being the national flower of Japan. The most important holiday is New Year's day, which is celebrated by every one. Houses are cleaned for the occasion and everybody tries to have new clothes to wear for the first time on this day. The

girls have a festival day known as the "feast of dolls;" that of the boys is the "feast of flags."

The first newspaper was printed in 1871, and now the newsboy is a familiar sight on the streets of Japanese cities. What a contrast between Japan and China in regard to the news of the outside world!

Osaka is the Venice of Japan and its old castle is of extreme interest, the stones of the castle even rivaling in size those of the Great Pyramids of Egypt. In Yeddo one of the features is its courthouse modeled after the capitol at Washington. Coal is found in abundance in North Japan, the output being as great as that of Great Britain. Some of it is shipped to California and Oregon. The aborigines of Japan are the interesting *Ainos* and they live much like our American Indians. They worship the wild bear and in all their villages are many poles mounted with bear skulls.

The great central peninsula is occupied by *India*. Only as large as the portion of the United States east of the Mississippi, it has a population of 300,000,000 and is thus one of the most thickly settled countries of the world. The Ganges is the principal river, is the source of great fertility, and is to India what the *Nile* is to Egypt. The interior of a portion of India is a mass of jungles and these are full of all kinds of animal life, and many an American boy has had his attention riveted to an interesting narrative of a hunting trip in the Indian jungle where elephants, leopards, lions, tigers, and monkeys abound.

There are four principal castes in India—Brahmins, warriors, merchants, and slaves. No Hindu has the power to change from the caste into which he is born. A member of the higher caste is not even allowed to touch the food cooked by one of the lower caste. A low-caste man dare not even let his shadow fall on a Brahmin when walking the streets.

Among the most interesting natives are the Parsees, who are descendants of the old sun worshippers of Persia. They do not worship idols but they keep sacred fire continually burning in their temples. The Parsees do not bury their dead for that would defile the earth; fire is too sacred to burn their bodies; they cannot be sunken into the ocean because water is the emblem of purity and cannot be defiled, so the dead body is carried to the top of a high tower to be devoured by vultures.

In *Bombay* there is a curious hospital. It is called the Jain Hospital. The Jains hold all animal life sacred and built this hospital for aged and infirm animals. Everything can be found here from a sick cat to a lame cow. A Jain will strain all the water he drinks for fear he will destroy some tiny, unseen, minute animal. India is the land of many such queer religious customs and is certainly the land of idols. The first locomotive was regarded as an evil spirit which some white man had found, and the natives crowded about it and worshiped it.

In the hotels of India only bedsteads are provided and the traveler must carry his own mattress and beddings. Before railroads, travel was chiefly by means of bullock carts. Northern India has had its temples destroyed by Mohammedan invasion. Southern India is more typical of ancient Hindu life. In all parts of India you find wandering magicians, conjurors, and snake charmers. The sleight-of-hand tricks of the Hindu magicians are perfectly marvelous. *Calcutta* is the city of palaces and the seat of government. It is also a great commercial center. It is progressive and modern, having several daily newspapers printed in English. One of the most interesting events of recent times in India was the Sepoy Rebellion.

The little country of *Afghanistan* to the northwest of India has been the cause of

much warfare from the earliest times. *Alexander the Great* at one time conquered it and added thereby to his great fame.

Arabia is mentioned in the oldest historical records, and its coasts were visited by the earliest navigators, yet its interior has been unknown because of the great desert. Arabia can probably claim to be the original country of the camel and the horse, two most important animals. How the Arab loves his horse. It lives in his hut with him, is fed from his own hand with dates and camel's milk, and is petted by his children. The intelligence of the Arabian horse is certainly marvelous.

The desert tribes are known as *Bedouins* and are fierce and quarrelsome. *Mohammed*, the founder of the great religion, was born at Mecca, to which place pilgrimages are made by countless thousands of his devotees.

Leaving Aden we may set sail on the Red Sea to the Gulf of Suez where we enter the Suez Canal, through which we can pass in about twenty hours, as the vessels must go slowly to prevent the washing away of the sandy banks of the canal. The tolls paid by the vessels passing through the canal amount to millions of dollars annually.

Soon we come to Port Said where we embark for *Palestine*, the land of Bible History. The first point is Jaffa, the landing-place for Jerusalem. In Jaffa is shown the place where stood the house of Simon the tanner, where Peter saw the wonderful vision related in the Bible. We can now go from Jaffa to Jerusalem by railroad. Among the beautiful flowers by the roadside is the "Rose of Sharon." Soon is reached a high plateau on which stands the most famous city of the world—*Jerusalem*. Since the time of *Abraham* there has been a city on this spot. Here Solomon built the great temple. Here is the center of the life and teachings of *Jesus Christ*, and just outside the city wall he was crucified. Here we may

find many market stalls where everything is sold as related in "Ben-Hur." Here we can purchase a pin or a pistol, a cucumber or a camel, a dove or a donkey, a man or a melon, a house or a horse. Near the hotel is the "Pool of Hezekiah" by which we pass on our way to the temple. Near by is the Via Dolorosa, the road to Calvary. Near the city is the Mount of Olives on the eastern slope of which is nestled the village of Bethany.

Going to the north of Palestine we find the little town of *Nazareth*, the home of Christ. Here is the same public fountain from which he drank in his boyhood.

Among other interesting portions of Asia is bleak *Siberia* of which travelers have told us so much. Through this barren country passes the Great Siberian Railway. *Siberia* is an immensely large country. It would contain all of the United States and then leave room for all the European countries except Russia.

Mention should also be made of the Hermit Kingdom of *Korea*, desired by Russia, China, and Japan; of Indo-China, with its Burmese and Karens. At Rangoon, the principal city, are immense lumber yards where the work of

handling logs is chiefly done by elephants. Rangoon is also the largest rice port of the whole world. In *Burmah*, it is said, the sweetest toned bells are manufactured. They do not as a rule have iron tongues, but are struck with a curiously shaped wooden hammer. *Siam* which adjoins *Burmah* is the most important country of Indo-China. It is extremely progressive and advanced, having in its chief city, Bangkok, all modern improvements found in American cities.

Enough has been said to indicate the great extent, rich history, and various peoples of Asia, and to show to us that in the much despised Orient was first begun the onward march of civilization that is rapidly filling the whole earth. Think only of the beginning of the sciences of mathematics, astronomy, chemistry, and physics, and you will have an idea of the great learning of its people in the earliest times. The many portions of the country now regarded as benighted in early times conserved all learning which has become our heritage and has made life in our own country at the dawn of this twentieth century so well worth living, so full of joy and comfort.

CHAPTER V.

THE DARK CONTINENT.

AFRICA differs so much from the other continents of the world, and so much concerning it remains unknown that it is called the "Dark Continent." We are constantly learning something new about this great triangle of land and its peculiar peoples, so that it is really the most interesting of all the continents.

It is at the same time the oldest and the newest of countries. The people of *Egypt* are the oldest of which we have any record as a nation. When *Abraham*, the patriarch of earliest Bible times, came into Egypt from the land of *Canaan*, he found a settled people under a well-established form of government; people skilled in the rudimentary arts; people who kept records of the interesting facts in their country's history by means of picture writing. At one time Egypt supplied all the *paper* used in the ancient world, but now the papyrus, the plant from which the first paper was made, is almost extinct. Many of the plants first known to history as valuable for food and useful for man, such as barley, leeks, onions, beans, and flax, seem to have originated,

and certainly were first cultivated in Egypt. To these plants in modern times have been added the cotton plant, tobacco, and sugarcane. As to animals, camels were known in the earliest times. Horses have always been used, and the Egyptian oxen were celebrated for their utility in transporting great loads.

So ancient are the Egyptian arts that no one attempts to tell of the time when pottery making and the mixing of colors for decorative purposes, as well as the art of tanning leather, were first known to the Egyptians. The *pyramids* show great engineering and architectural skill, and the method used for preserving the dead by means of *embalming* cause the people of to-day to marvel at their success.

No object in Egypt is of greater interest than the *Sphinx*. The Sphinx was hewn out of the solid rock and has a human head on the body of a lion. It is in a recumbent posture with the forepaws stretched forward, and the head-dress resembles an old-fashioned wig. The largest sphinx is that near the group of pyramids at Gizeh. The body is monolithic, but the paws, which are thrown out fifty feet

in front, are constructed of masonry. In its commanding expression, its strength and dignity, the whole face pervaded with calmness and power, the eyes and deep intelligence, and with lips smiling recognition to the brilliance of the rising sun, this mighty "watch-tower," as its name signifies, impersonated light after darkness, fertility on guard against the sterility of the desert.

The employments of carpentry, boat-building, working in *leather*, and glass-blowing, as well as pottery-making, originated in Egypt, and were famous among the nations of the ancient world as early as 1820 B. C. They introduced the process of *gold beating*, working in iron, using the bellows, and *weaving*.

To understand Egypt it is necessary to know the *Nile*, not only the most famous, but the most marvelous of rivers of the globe. The following Egyptian inscription is frequently found: "All things created by Heaven, given by earth, brought by the Nile from its mysterious source." The Egyptians made the 15th of September their New Year's Day because it was the time of the highest flood in the *Nile*. It has been said of the Nile that everything depends upon the river; the soil, the produce of the soil, the species of the animals which it bears, the birds which it feeds; and that for this reason the Egyptians placed the river among their gods, giving it the face of a man with regular features and a vigorous portly body, such as befits a man of high lineage.

Passing from Egypt we go through the sparsely populated country of *Tripoli*, ruled over by Turkey, and soon reach *Tunis*, whose people are chiefly engaged in raising fine camels and bees, and in securing the *coral* that abounds in its coast waters. Ancient *Carthage*, the famous city of history, is located on the north coast of Tunis.

Still further to the west lies the mountain-

ous country of *Algeria*, which is now owned by the French. Since 1871 it has been used extensively to supply homes to the people of *Alsace* and *Lorraine*, who wish to preserve their French nationality instead of becoming German subjects. *Morocco* is the extreme north-western state of Africa and is the interesting home of the ancient race of *Moors*, an intellectual and handsome race of people, but renowned for their cruelty, revengefulness, and bloodthirstiness. They still practice their much-dreaded *piracy* to a limited extent. An interesting feature in traveling through Morocco is the great number of birds, and every town has its colonies of storks. The profusion of insect life is a pest to the traveler. Along the coast many of the people are engaged in mackerel and lobster fishing. Morocco has few roads and bridges, no postal system, and no stable form of government, so that its commercial interests have never been developed, as they might be under good control. Because of this backward condition as compared with other states on the coast of the Mediterranean, Morocco is called the "China of the West."

Abyssinia, to the south of Egypt, is one of the oldest monarchies of the world, and has been governed from ancient times by an emperor. In traveling through Abyssinia we find that the people belong to several races, but the majority of them have the well-formed, straight, regular and handsome features of the *Caucasian race*, but they are almost black in color. They are in fact members of this race, and thus we can see the error of speaking of the "Caucasian or white race," as is so frequently done in school books. The people of Abyssinia are engaged in almost continual warfare and are rude and barbarous.

Two other independent states occupied a part of South Africa until the late war between the British and the Boers, which broke

out in October, 1899,—The South African Republic (also known as the Transvaal because it lies across the Vaal River), and the Orange Free State. These two countries were annexed to the British Empire in 1900, under the names, respectively, of Vaal River Colony and Orange River Colony. Orange Free State was founded in 1835 by Dutch settlers from Cape Colony, and became independent about twenty years later. In the meantime a portion of the Boers went still farther north, crossing the Vaal River, where they founded the city of Pretoria. In 1877 the Boers called upon the British to help them repel the native Africans with whom they were almost constantly at war. The British helped the Boers, but claimed the country as pay for their trouble. The Boers rebelled in 1880 and defeated the British at Majuba Hill. Four years later they were declared independent, but the British claimed suzerainty over them. This led to the recent war.

The discovery of the *Congo River* led to the foundation of an independent state in the center of the great continent. The obvious advantages of this splendid water way in the opening up of the interior districts led to the formation at Brussels in 1878 of a "Society for the Exploration of the Upper Congo," under the patronage of the Emperor of Belgium, Leopold II. Under the auspices of this society Stanley returned to Africa in 1879 to open up the river and form a free state under European auspices. This state is known to-day as the *Congo Free State*.

Excepting the few small states in the central Sudan there are no other independent states in Africa except the one which was founded as a home for American slaves and their descendants long before the Emancipation Proclamation abolishing slavery in the United States was enacted. It is called *Liberia*. At first the slaves were taken there in large

numbers, so that there are now in the country about 18,000 descendants of American negroes, with 1,050,000 aboriginal inhabitants.

We have said that Africa is at the same time the oldest and the newest of countries, and we have seen that it embraced the oldest historical nation. On the other hand, the forests in the heart of Africa are still so new and unbroken that in many cases we know very little about the people who inhabit them except from the accounts furnished by the explorer *Stanley*, who conducted an expedition into this region. Though Stanley marched for at least six months in the very heart of Africa we must remember that the country in parts was almost impenetrable and his rate of travel at first was only from two to ten miles a day. The people inhabiting this interior forest country opposed his advance, and he was especially obstructed by the terrible attacks of a diminutive, dwarf-like people known as Pygmies, who fought with small but deadly poisoned arrows.

While the great interior districts have been explored only to a limited extent, still the territory is claimed as part of the possessions of the great European nations either as direct colonial possessions or as protectorates. The principal countries having possessions in Africa are Great Britain, France, Germany, Spain, Portugal, Italy, and Turkey.

The ancient state of Egypt is tributary to the Sultan of Turkey, as are also Tripoli, Fezzan, and Barca. Great Britain claims as her share the interesting colony at the southern end of the continent, known as the *Cape Colony*, also a portion of Central Africa and East Africa including *Uganda*, and a strip of territory on the western coast, known as the Niger Territories and the West African colonies.

The French own the ancient states of Algeria and Tunis, and the region known as French Congo and Gaboon on the right bank

of the Congo River. The little state of *Dahomey* is under the protection of France, and the state of *Senegal* and a strip of land on the coast known as Ivory Coast, east of Liberia. On the opposite side of the continent lies the protectorate of the Obock and Somali Coast, just east of Abyssinia.

The German sphere of influence extends over *Cameroon* on the Bight of Biafra, while farther to the south is her possession known as German Southwest Africa. In the eastern part of the continent Germany has her most valuable African possession, German East Africa, lying to the south and east of Victoria Nyanza.

The Spanish possessions in Africa are limited to the coast region opposite the *Canary Islands*.

Italy, which until recently claimed a protectorate over Abyssinia, is limited to the *Somali Coast* in the extreme eastern part of the continent.

Portugal owns the territory lying between the Congo Free State on the north and German Southwest Africa on the south, known as *Angola*, also a small state on the coast of *Senegal*, and a narrow strip of territory on the eastern coast opposite the Island of *Madagascar*.

Thus we see that while Africa is called the Dark Continent and many thousand square miles of its territory has never felt the influence of civilization, yet enough of the great natural boundaries of the continent have been discovered and located by *Livingstone*, *Stanley*, and others, to make it possible for the various countries to define with a considerable degree of accuracy their respective spheres of influence, and where the maps of ten years ago had printed upon them the word "unexplored" in a dozen different places we find now the name of some European nation attached to the aboriginal or given name

of the various regions. All this is due to the work of practically two men, and we cannot better close this brief chapter on the "Dark Continent" than by giving a short sketch of the work they did. As Egypt had her heroes whose names they carved on monuments of stone or handed them down in tradition, so modern Africa has her heroes, and the names of Livingstone and Stanley are graven on the hearts of all civilized peoples for their heroic efforts in opening to the world the heart of the great fertile region of Africa.

David Livingstone, who was born in England in 1813, was sent out as missionary to South Africa at the age of twenty-seven. For nine years he remained among the natives, often in danger of losing both life and health. He heard that a large lake lay to the north of *Kalahari Desert*, and he set out to explore that region. This was the first of a series of journeys he carried on under the greatest of difficulties and hardships. After various journeys about Lake Nyanza and the Zambesi region, Livingstone set forth in 1865 to settle the much disputed question of the Nile sources. When three years had passed without any word from him the New York "Herald" sent out Henry M. Stanley to find out and relieve, if necessary, the intrepid traveler. Stanley found him in 1871 at Lake *Tanganika*, his ardor in no wise subdued by his long absence from civilization. The two parted in 1872, and a year later Livingstone died. His body was buried in Westminster Abbey, having been brought to the coast, preserved in salt, by his faithful followers.

Stanley has lived a life of adventure. He was born in Wales in 1840, and at the age of three was placed in the poorhouse, but when only fifteen he shipped as cabin boy to New Orleans. Here he was adopted by a man whose name he assumed, discarding his own name of John Rowlands. After his foster father's

death he entered the Confederate army and was taken prisoner. When discharged he enlisted in the United States navy as a volunteer and became ensign on the "Ticonderoga." At the close of the war he became a newspaper correspondent. In 1869, while traveling in Spain he was asked by the New York "Herald" to go and find Livingstone. Journeying by way of the Crimea, Palestine, and India, he entered Africa through *Zanzibar* in 1871. He visited the continent again in 1873 and 1874, still as correspondent, and undertook an exploring expedition to the Equatorial Lake region of that continent and

for the first time traced the Congo River to its mouth. His next trip was in behalf of the "Society for the Exploration of the Upper Congo." In 1887 he organized an expedition to relieve Emin Pasha, who had been shut up in the lake region with his Egyptian followers as a result of the Mahdist uprising. After a series of extraordinary marches through a forest, often occupied by hostile natives, he met Emin Pasha and succeeded in bringing him and his company away safely, in January, 1890. His achievements have won for him a title from the Queen, and better still the gratitude of the whole civilized world.

CHAPTER VI.

THE "OLOGIES."

In the Middle Ages, the circle of sciences was divided into two main divisions—the trivium and the quadrivium. The trivium comprised the three liberal arts of grammar, rhetoric, and logic; the quadrivium comprised four—arithmetic, music, geometry, and astronomy.

The word "science" originally meant simply knowledge, and it is not certain that it had any distinct meaning as opposed either to literature or to art. By the sixteenth century, however, the word "science" denoted connected and demonstrated knowledge.

The great teachers of to-day contend that science is only highly organized knowledge, differing in nothing from common knowledge save its accuracy and constant testing and verification.

Professor Huxley once said: "The mode of investigation which yields such wonderful results to the scientific investigator is in no wise different in kind from that which is employed for the commonest purposes of every-day existence. Common sense is science exactly in so far as it fulfills the ideal of common sense: that is, sees facts as they are, or at any rate,

without the distortion of prejudice, and reasons from them in accordance with the dictation of sound judgment."

Science to-day is divided into several branches and each branch has a special name. Thus astronomy makes a study of the earth, sun, moon, and stars in their relation to the universe as a whole. Geology considers the structure of the earth, and how it came to be as it is. Biology is a study of life, and this branch of science is divided into several branches, as zoology, or the study of animal life; botany, the study of plant life, etc.

There is nothing more interesting than the study of the various works of nature, but many a boy and girl is often frightened away from such subjects on account of the long technical name, or else for the same reason they do not know where such interesting reading can be found. As an eminent divine once said: "God made flowers and man made botany. God made stones and man made geology. God made the stars and man made astronomy. I like flowers and stones and stars better than I do botany, geology, and astronomy."

Scientists usually take a foreign word for

the name of a thing, and to this they attach the suffix "ology" (from the Greek word "logos," meaning a discourse). It is not strange that the "ologies" have become a bugbear to the casual reader. Merely the long names have been the means of turning away many a reader from some of the most interesting and useful knowledge extant.

To the mind of the average reader, the word *Geology* conveys nothing attractive. But suppose that under this head the reader knew that he could find out that the horse once had five toes, and that the horse's leg from the knee down is merely the middle toe! All the others have in the course of time disappeared. But even to-day we occasionally see a small foot growing on the lower part of a horse's leg. All these things geologists have discovered down deep in the rocks. In this way the men who have been studying the earth and its various formations have thrown much light upon the science of life, or *Biology*. Biologists take the early forms of life, and follow them up through one age and another, and thus prove that species of animals and plants actually change in form and size.

The study of life is carried on under two main heads, *Zoology*, or the study of animals, and *Botany*, or the study of plants.

Everybody has seen the picture of a giraffe, and noticed the long neck. The study of animals led men to seek the reason for different species. Animals which, in a state of nature, are distinguished by form, size, color, and kind, constitute a species. It has been observed that the differences between many species are very small, and men have reasoned that all the species were derived from one species. They argue that the changes are the results of different kinds of food, different climate, and other conditions. For example, consider the giraffe. As soon as the pasture dries up he has to get his food from the trees.

The lower leaves can be reached very comfortably; but the more he eats, the farther he has to reach, and he has kept up this practise through a long period of years, the consequence being that his neck has grown very long.

In the above fact we have a touch of *Darwinism*. Comparatively few people even know what is meant by this word, yet at the basis of all this great philosophy lie only four simple principles, which need only to be mentioned to be familiar to the experience and observation of all. First, Heredity—the offspring always resembles the parents. Second, Variation—no two animals are exactly alike. Third, Struggle for existence—only a small number of those born ever reach maturity. Fourth, Survival of the fittest—those that do reach maturity are the ones best fitted to survive. The corner stone of the Darwinian theory is the second principle, variation.

In the study of plants every one is interested to a greater or less degree. What is more fascinating than to study the parts of a flower, and to find the various methods by which the seeds are carried from one place to another? It was in the study of an "ology" that the elements of sugar were found in the beet, and the great beet-sugar industry was established. Moreover, no one can afford to be ignorant of some forms of plant life. *Bacteria* belong to the plant kingdom, and it is necessary that one have a general knowledge of them in self-defense.

In ancient times, the Chaldeans made a study of the motions of the heavenly bodies and their supposed influence on human and terrestrial affairs. This science was called *Astrology*. The study of the stars was a secondary matter because the real purpose was the prediction of human events. This practise was known by the Egyptians and the Hindus over 2,000 years before Christ. Dur-

ing the Dark Ages it was very popular in Europe, and was practised even as late as the sixteenth century. Thus it was that the science which we know as *Astronomy* arose.

Within the last few years the American public schools require the pupils to study the human body and how to take care of it. It is necessary to have a general knowledge of *Anatomy* and *Physiology*. Under the head of anatomy we may learn of the nervous system. Any boy or girl can learn a practical lesson in the nervous system in the following manner: Catch a frog and cut off its head. Tie a string around its neck and suspend it in the air. It is surprising to see how many things the frog can do with his head cut off. If a drop of acid be placed on one side of the frog's belly, the leg on that side will come up and try to brush it off. If a drop be put on the other side, the leg on that side will come up. If a drop be put on one side and the leg on that side be held down, the leg on the other side will come over and brush off the acid.

Several centuries ago there was a great effort made to discover some method of changing the baser metals into gold and silver. This was known as the science of *Alchemy* which was

the forerunner of *Chemistry* just as astrology was the forerunner of astronomy. The alchemists also tried to find some substance which would possess the power of removing all the seeds of disease from the human body and of renewing life. This substance was called the "philosopher's stone." It is easy to see that the object of this experimentation was not scientific. It was not without its good results, however, for it led men to experiment with various substances, with the result that the science of chemistry was established.

In the realm of natural philosophy, one learns of mechanical power, light, heat, electricity, and magnetism. In this grand department of knowledge is conducted an investigation into what exists and why, a codification, so to speak, of the immutable laws of nature.

And lastly we come to the study of man in his social relations, or *Sociology*.

It is not our purpose to advocate the change of the names of any of the sciences. We can only say that it is unfortunate from the point of view of the casual reader that they have been so named. We desire simply to call attention to these interesting facts which can be found under such heads, and thus set up a guidepost directing the reader to them.

CHAPTER VII.

THE HANDICRAFTS.

The first implements of primitive man were picked up from the ground, ready-made. They were bits of stone, sticks, sharp flints, and water-worn sandstone which were used by the original craftsmen as tools and weapons.

Little by little, experience and use suggested to the primitive workman that the club, torn from the tree, could be made more serviceable by having a stone fastened to one end, and thus the *ax*, or hatchet, probably the first tool made by man, was evolved. It is probable that primitive man used the sharp-edged flint, which he picked up from the ground, as a knife, before it occurred to him, or was in some way suggested to him, that his *knife* tied to the end of a stick, was increased in efficiency as a cutting-tool, and made a serviceable weapon as well.

It appears from the finds of articles left as souvenirs by the first of the human race, that man, in the first days of the human family, chipped flints against each other to produce a cutting-edge or a point, and this, probably, was the very beginning of what is now called skilled labor. The first mechanic was a stone-worker. He took a jagged piece of flint in each hand, and by smartly striking them to-

gether, flaked the hard substances, and thus secured a roughened, serrated edge in each piece.

The next step in the development of the cutting-tool, was to give a finish or shape to the flint after it had been roughly fashioned by the flaking process. This was done by rubbing the flint upon a sandstone. The rubbing wore away the rough edges, and gave the original mechanics smooth cutting-edges and a shapely article. Just how many centuries were required to bring the primitive craftsman up to the polishing stage in the evolution of the mechanic is a matter of conjecture; but it is not too much to believe that while the maker of tools and weapons was advancing with the world's progress, the men and women who took the skins of animals and prepared them for clothing and covering discovered some method of curing the *skins*, and thus the tanner was born.

The wood-worker was one of the pioneers of the industrial world, and the fact that pots and cups made of clay have been found buried with flint spear-heads, flint knives, flint hatchets, bone needles, and bone fish-hooks, proves conclusively that the potter must be placed

among the trades that can trace their ancestry back to primitive days.

Some wandering tribe in the days known as the *Stone Age*, discovered copper. The metal probably lay on the surface of the ground; the nomads thought it was a soft stone. Its toughness and malleability suggested its use in making tools, weapons, and utensils, and the *Copper Age* began. At first the copper was simply pounded, or hammered, into shape with the stone tools of the first metal worker, so that the copper-smith may rightly lay claim to having the longest trade pedigree of any metal worker. Just when it was discovered that an alloy of tin and copper produced a harder metal, possessing at the same time the toughness required, is not known; but the fact remains, and is proved by the articles themselves left by the antediluvian craftsmen, that *bronze* tools, arrow-and-spear heads, utensils, and ornaments, were made long before iron was used or worked.

Probably the first historical reference to the beginning of the *Iron Age*, which followed the *Bronze Age*, is found in the Holy Bible, Gen. 4:22: "And Zillah, she also bare Tubal-Cain, an instructor of every artificer in brass and iron." The first craftsman, however, mentioned in writing was Cain. He was a husbandman, a farmer; but he seems to have been more, for he built the first city, and he introduced the use of weights and measures. Tubal-Cain, who was born about 3700 years before Christ, and who, according to Holy Writ, was the first blacksmith, was contemporaneous with Jubal, who invented wind and stringed musical instruments; with Jabal, who was the first to build a tent for habitation and to use cattle for draught purposes; and with Naamah, the first woman inventor, for she introduced the art of spinning and weaving.

Whatever the exact date of the beginning of the *Iron Age* was, it is certain that the Jews

were among the first to work that most useful of all metals. Prior to the *Iron Age*, the carpenter, or hewer of wood, the tanner, the stone worker, the potter, and the husbandman were the industrial chieftains; but the blacksmith stepped into the world, and at once assumed first place among craftsmen. The iron worker gave stronger, sharper, better tools to his fellows, and the progress of the world was accelerated when the art of working iron was discovered. From that time on, the craftsmen increased and multiplied. Each trade, as it was born, divided itself into specialties, and thus the craftsmen, mechanics, and skilled workmen of modern days came forth naturally and as part of the general plan of evolution. Every trade, no matter how insignificant it may be, can be traced back through the ages to those days when the first tool of mankind, a simple cutting edge on the side of a broken piece of flint, was picked up from the ground, and adapted to the use of man.

The brickmaker was born 2247 B. C. and with him the hodcarrier and mortar mixer; for the tower of Babel was built of *bricks* which were held together with *cement*, a kind of *asphaltum*. Crockery was made by the Egyptians and Greeks 1500 B. C., and it is believed that the original wagon and carriage maker lived about the same time; for in 1486 B. C. the first *chariot* was built.

History honors Dædalus, an Athenian, as the inventor of the ax, the wedge, and masts and sails for ships. He lived 1240 B. C. so that the cutler and the sail-maker belong to an ancient trade family. Noah, however, was the original shipwright, so far as recorded history is concerned; for he built the ark, the first vessel mentioned in writing. Noah, also was the father of the brewer, the distiller, and other makers of spirituous liquors, for in 2347 B. C. he made wine from grapes.

Watchmakers and clockmakers can trace their craft back to 562 B. C. when dials were invented, and their trade became fixed when Papirius Cursor erected the first *sun-dial* in Rome 293 B. C., and first divided time into the hours. Bookbinders will find their original in Attalus, king of Pergamus, who 198 B. C. made *books* with leaves of vellum to be used in lieu of rolls. Paper was invented by the Chinese 170 B. C. It was made of silk fiber. Somewhere about the 8th century A. D. *paper* made with cotton fiber was introduced by the Spanish Moors, and this prepared the way for printing, the "art preservative of arts."

The millwright became a craftsman sometime prior to 70 B. C., for in that year the first water-mill, which was built near a dwelling of Mithridates, was described. Twenty years later a second *water-mill* was built on the Tiber in Rome. Iron chain cables were used by the Veneti 55 B. C., indicating that the blacksmith was well advanced in his art long before the birth of Christ.

Gunpowder, a composition of niter, charcoal, and sulphur, was in use, so far as records can show, in the early part of the 14th century, but occasional passages in the works of ancient writers hint that gunpowder was known back in the obscure ages. Berthold Schwarz, a German monk, seems to have combined the three ingredients that enter into the making of *gunpowder*, in 1320 A. D.; but gunpowder and its effects were described in writings centuries before. Whoever invented gunpowder placed the modern craftsmen under great obligations; for gunpowder brought the simple peasant and the armored knight to the same level, and in time changed social conditions to the betterment of the artisan.

It gave war a new character, a wider field, and thus opened up trade and craft secrets and developed new industries. The storming

of Mentz scattered the first printer over the land and gave *printing* to the world. The looting of Greece in the early part of the 12th century brought the silkworm and the art of silk-weaving to France, Italy, Spain, and England. The invasion of Europe by the Saracens in the 11th century diffused the knowledge of gunpowder, the mariner's compass, and the art of glazing pottery and earthenware, and the art of making felted fabrics came with the Tartars who swept into Europe in the 14th century.

When John Gutenberg first printed a page from separate and movable type in Mentz, in 1434 A. D., the whole range of compositors, proof-readers, pressmen, stereotypers, and printers' devils was born, although the art of printing from blocks was known centuries before Gutenberg was born. The first printing-press was a common screw press, of which the modern copying press used in offices is an example. Blaeuw, an Amsterdam printer, improved this press in 1620. The first newspaper printed by machinery run by steam power was the *London Times* in 1814, and the press was made by König, a German.

When steam was harnessed to the printing-press, two of the greatest of all inventions were brought together.

Steam as a power was known in the time of Hero, the Greek, 150 years before the birth of Christ, and the first steam engine was a rotary engine, a globular boiler, which revolved on centers by the recoil of the steam that rushed through opposing nozzles. But this first of all steam engineers went further, for he made a fountain in which the water was jetted high by steam pressure. A steam gun was made in 1500 A. D., and according to ancient writings water was elevated, not pumped, by steam pressure acting direct, in 1600 A. D. But the first engine, so far as records indicate, was invented and used by Dr. Papin, a French scientist, 1695 A. D. This

was an atmospheric engine, in which the piston was lifted by steam pressure, and returned by atmospheric pressure. Dr. Papin was a cautious man; for he invented a safety-valve to keep his boiler from blowing up. The boiler was divorced from the engine cylinder by Newcomen in 1705, and that engineer put a walking beam on his cumbersome machine in the same year. A lazy boy, hired to open and shut valves on Newcomen's engine at the proper times, tied strings to the walking beam and valve levels, and the valve gear was invented in 1716.

But it was Watt, the English engineer, who started the steam engine on its way as the greatest machine ever conceived by the brain of man, when he jacketed the cylinder, put a crank on his engine, used the expansive property of steam, invented the rotary ball governor, the D valve, steam gauge, indicator, and packed his piston rod with a lubricant instead of water, all between 1769 and 1784. The first locomotive engineer was Trevithick, the plucky Welshman who built the first high-

pressure locomotive in 1802, but it remained for George Stephenson to improve the locomotive and build what is now regarded as the father of all locomotives, the "Rocket," in 1829.

When Dr. Gilbert, in the early part of the 17th century, coined the word "electric," he used it to describe his discovery of the power of *electricity*, and the difference between conductors and non-conductors. Until the present century gave the world the electric light, the dynamo, the oscillator, the telegraph, and all kindred devices which use electricity or magnetism for cause and effect, electricity and magnetism were the toys of scientists, the wonder of the ignorant, and the tools of the charlatan. But all crafts and trades, all skilled workmen, must go back to the woodchopper, the quarryman, the miner, the tanner, the smelter, and the farmer, for from them come the raw materials and the starting tools which make it possible for the craftsmen of whatever trade to extend the ramifications and subdivisions of the skilled labor which is the triumph of this age of steel and electricity.

CHAPTER VIII.

INVENTORS AND INVENTIONS.

We may divide the history of inventions into three great periods. These divisions will necessarily be somewhat arbitrary, but on the whole not illogical. To be sure necessity has at all times been the mother of invention; but there have been great periods in the history of the world when, it seems, more things were necessary. At any rate we may clearly distinguish certain periods when there were a great number of very important inventions which stand out very prominently in the economic progress of the world.

The first period may include all the inventions up to the middle of the fifteenth century, when Gutenberg invented printing. The second period extends from this time down to the discovery of steam power by James Watt in 1765. The third period would be the modern period with the millions of inventions in every department of human activity.

The first invention of which we have any authentic record was that of the mariner's compass. The Chinese claim to have invented this instrument as early as 2600 B. C. The *Wadstone* was used by them to guide their cars and carriages when they could not see the sun

and the stars, and they used the magnetic needle in navigation centuries before the Christian era.

With the invention of the compass and the consequent encouragement to navigation, we find men discovering new lands. In order to convey an idea of these discoveries to their fellow men, it was necessary to secure some lucid representation of what they saw, and about 600 B. C., Anaximander of Miletus invented maps.

Men could now find places a second time, and trade soon sprang up between far distant countries. As early as 551 B. C., *silk manufacture* was introduced into Europe from China, although it did not make any great progress until the reign of Augustus, 500 years later.

About 332 B. C., the great schools and library were established at Alexandria, and here gathered learned scientists and philosophers from all over the known world. Here *Archimedes* invented the *Archimedean screw*, demonstrated the principle of the lever, and also invented the compound pulley.

The increase in trade and the inter-communication between nations made it neces-

sary to invent some method of exchange, and as early as 600 B. C., *banking* was carried on in ancient Babylon. Here was conducted an important advance, exchange, and general financial business. The Greeks had some knowledge of banking, as did the Romans. The first bank established in Italy was by the Lombard Jews in 808 A. D.

For centuries the medium of exchange was either bank paper or bullion. The gold or silver was weighed out, hence we have the term pound in English money. It was not until the beginning of the fourteenth century that there was any *coinage* of gold in Europe.

It is a strange coincidence that the real invention of *gunpowder* occurred during the same year that the first gold was coined in Europe, 1320 A. D. It is thought that the Chinese, who, by the way, seem to have invented a great many important things, were the first to *invent* gunpowder. It was not used as a military agent until the seventh century B. C. when the Greeks used it in the form of rockets or liquid fire. A German monk, Berthold Schwarz, was the first to make any practical use of gunpowder. He discovered a method of thoroughly mixing the ingredients forming a meal. In less than a half-century gunpowder was used in improvised *cannon* in England and other European countries.

One invention of great importance has been overlooked, that of *glass*. By some it is claimed that the Egyptians had a sort of opaque glass over 3000 years B. C. It was used as beads, vases, small figures, and for inlaying wood. Transparent glass, in the shape of *bottles*, was made by them in the seventh century B. C. For centuries Egypt was the home of the glass industry. The sand at Alexandria was the finest known for the purpose. Glass was exported from here into Greece and Rome.

The Phœnicians also had a knowledge of

glass-making and shared the industry with Egypt. Venice in the seventh century began the manufacture of glass, and thence it spread all over Europe.

II

"How grateful is the search ! with pride to trace

Useful inventions, that exalt our race."

Emerging from the dark ages, the nations of Europe were put into communication with all the world through the instrumentality of the Crusades. Commerce received an unexampled impulse, and the literature and art of the various countries were scattered over the whole world. There was a great need for some method of conveying and preserving these things. True, indeed, the old methods of writing it all down by hand, or committing everything to memory, were known and practised, but the volume of ancient literature and writings, on all conceivable subjects, which was brought from the store-rooms of the monks, could not be mastered in a lifetime.

To meet this great need a German, Johannes Gutenberg, in 1430 invented *printing*. He used movable type, and thus was able to spell any word he desired. A great number of men set up claims as the discoverers, but the best authority gives the honor to Gutenberg. The *type* used was large and coarsely made, and not many words could be printed on one sheet. The art of printing, both as to type and presses, was gradually developed and rapidly spread to all European countries. The first book printed in America was from a printing-press in Mexico (1536).

We find that within a few years the art of printing was introduced into England. Here, too, gunpowder began to be used in all the wars, and muskets were invented in 1521. In the same century *watches* were manufactured. The great advance in printing created an

enormous demand for paper, and in 1558 *paper manufacture* was introduced into England.

Increased interest in scientific research and the making of spectacles led two men, in 1608, to invent a *telescope*. About this time there were many improvements in the microscope and it became generally known. Many forms of animal life too small to be seen by the naked eye were readily discovered. Bacteria came to be known and the germ theory of disease owes its origin to the invention of the microscope.

In the early part of the seventeenth century *iron* was brought into great use, and many improvements were made in smelting.

Perhaps the most important scientific discovery of the first half of the seventeenth century was that of the circulation of the *blood* by Dr. William Harvey, who was physician to King James I and King Charles I.

During the last half of the seventeenth century a few inventions were made, as the hydraulic press, the air pump, and some rude attempts at steam engines.

In the first half of the eighteenth century no inventions of any importance were made; but from 1746 to 1752 *Benjamin Franklin* carried on his famous investigations into the nature of lightning, and invented the *lightning-rod*.

III

We have seen in the first and second periods that some of the most important inventions in the world were made. We look upon them to-day as the work of nature rather than that of man. Who stops to think as he reads his morning paper, that **only** 500 years ago no papers or books existed except as they were written by hand. It would seem unnatural indeed for us to read to-day of nations going to war and fighting great battles with axes, spears, and arrows, without the use or even the knowledge of gunpowder.

In the present era when hundreds of things

are being invented yearly, we forget that these old things also were at one time unknown and had to be invented.

The modern period of invention began when a young man sitting in his mother's kitchen, saw the steam in the teakettle raise up the lid. He perceived that there must be some power in the steam. This young man was *James Watt*. By the time he was 25 years old he had constructed a *steam engine*. He continued to make improvements on it, and eight years later took out a patent.

No one can say that any one invention has been the most important one; but we may make a list of inventions of first importance, and Watt's invention would surely come in this class.

Contemporaneously with Watt, and indeed before Watt had secured a patent upon his steam engine, a poor hand-spinner was working away in his little home in England, trying in vain to spin several threads of cotton at one and the same time. Accidentally his little girl overturned his spinning-wheel, and as he saw the wheel revolving vertically, he resolved to construct a machine with several vertical wheels, which he did. This man was James Hargreaves, and his machine was the *spinning-jenny*. He kept his discovery a secret. His neighbors could not understand how he could produce so much yarn. They became jealous, broke into his house, and destroyed the machine. Hargreaves could not secure a patent for his machine and died in poverty. His invention, however, has made his native country, England, the leading cotton manufacturing nation in the world.

It was during this same decade, too, that Arkwright invented the spinning frame. He also was refused a patent by the English Government.

In 1776 a Frenchman named De Jouffroy constructed a small *steamboat* which he exhib-

ited on the Seine River. The attempt was only partially successful. It remained for a young Pennsylvanian, who was visiting in England, to bring to New York a large Watt steam engine and to construct and launch the first really successful steamboat. *Robert Fulton* in 1807 built this boat and called it the "Clermont."

While these numerous experiments were being made in steam navigation, *Galvani*, an Italian, discovered in 1786 dynamic *electricity*, and the small storage batteries of to-day are known as Galvanic batteries.

In 1793 a young man who went South to study law, saw the slow and tedious process of separating the seed from the cotton which grew there abundantly. He set about to discover some new method of doing this work, with the result that the *cotton-gin* was invented. *Eli Whitney* was the young man. His machine could do the work of hundreds of hands.

The year following the construction of *Fulton's* steamboat, some men were experimenting with electric currents in clay with the result that *aluminium* was discovered.

In 1818 the attention of the British Government was called to the condition of the roads in the kingdom. *John Macadam*, a Scotchman, was appointed road commissioner and introduced the method of making roads which has ever since borne his name.

Louis Daguerre, a French scene-painter at Paris, made a famous diorama or scenic representation in 1822, and his experiments along this line eventually led to the discovery of the *Daguerreotype* process. The discovery was not announced until 1838. Although this process is now almost obsolete, it was really the first which was of any practical value.

From the earliest time we have seen that the great strife has been to get the various parts of the world into closer communication.

The mariner's compass was invented, maps were made, gunpowder was used to enable people to protect themselves in going to and from countries, printing helped men to communicate by messengers, steamboats reduced the distance between countries from months to days.

In 1830 the first steam locomotive in America was constructed by *Peter Cooper*, after his own designs, and placed on the Baltimore and Ohio Railroad. Previous to this time the cars had been drawn by horses.

For a long time men had been trying to get up some means of telegraphic communication. *Samuel F. B. Morse* was the first to make it possible to put people who were hundreds of miles apart, into instantaneous communication. In 1832, while on the way home from England, he conceived the idea of the *telegraph*. He made drawings of the recording telegraph and in the twelve years following he worked out the system successfully, and in 1844 the first public telegraph line was established between Washington and Baltimore, a distance of 40 miles. Morse immediately passed from abject poverty to immense wealth. He was honored at home and abroad. Napoleon presented him with 400,000 francs.

One year after the telegraph was patented, *Elias Howe*, of Boston, brought out his new sewing-machine and took out a patent for it the following year, 1846.

This was soon followed by many improvements by *Isaac M. Singer*; but with all the new *sewing-machine* patents they are all like *Howe's* old machine in at least one respect, namely, all have the eye in the point of the needle.

About this time *Cyrus W. Field* began his labors of connecting Europe and America by submarine telegraph lines. He obtained the exclusive right of landing cables in Newfoundland and organized a company to construct the lines. After four attempts he succeeded in 1866 in completing the first *Atlantic telegraph*.

Before the first successful Atlantic cable had been laid, Professor Reis, a German, constructed an instrument which conducted the voice and sent a series of clicks along an electric wire to a receiver at the other end. This instrument was made of a coil of wire, a knitting-needle, the skin of a German sausage, the bung of a beer barrel, and a strip of platinum. Edison and Gray took up the idea and *Alexander Graham Bell* in 1876 exhibited a practical telephone.

Thomas A. Edison, who started in life as a newsboy, began some experiments with the telegraph. In 1872 he invented the duplex system of telegraphy and a little later the printing-telegraph for stock quotations. In less than five years he took out over fifty patents, among which was the *phonograph*. He successfully instituted the *electric light* in 1879.

The *Roentgen or X-Ray* was discovered by

Professor Roentgen in 1895. The rays possess the property of penetrating substances opaque to light, such as five hundred leaves of paper, a thick block of wood, the human hand, or any similar object. Objects can be photographed while under these rays of light, and thus we may have a picture of the bones of the hand, or the skeleton of a rat, etc. This is the latest invention of any great importance.

Guglielmo Marconi, the young Italian electrician, has become famous through his invention, in 1895, of a system of *wireless telegraphy*, by means of which messages can be sent and received over long distances without the use of connecting wires. Wireless telegraphy is now in use to quite an extent over short distances. On Dec. 12, Marconi succeeded at St. Johns, Newfoundland, in receiving signals that were transmitted across the Atlantic Ocean from Cornwall, England.

CHAPTER IX.

SUCCESS OR FAILURE.

Real success is never reached in a single bound, yet Benjamin Franklin said that "the road to success is as easy as the road to ruin." Many an American has arisen from the bare-foot boy on the farm to the wealthy merchant, the eminent statesman, or the honored inventor.

It is not our purpose in this short chapter to give advice, nor can we hope to state things which will please everybody. Yet we may point out a few facts concerning the elements of success as seen not only in the successful men of the past but also as seen in the daily operation of any large business concern.

It is essential that every young man and young woman have some definite aim in life. Each one should mark out for himself a course and then bend every effort to follow that course. The current of mere circumstances is treacherous and unsafe. It is not surprising that those who aim at nothing accomplish nothing in life. Any one can drift but it takes pluck to stem an unfavorable current.

Once the occupation is chosen, concentration is essential. A man may have the most dazzling talents, but if his energies are scattered he will accomplish nothing.

The young man in the store will earn his salary, perhaps, by working the required number of hours in the day, but if he does not give his work a thought after he has quit for the night, he will never make any great advancement in his calling.

The young man, on the other hand, who is reading up the history of his business, looking up facts concerning the manufacture of goods, if he be in the employ of a dry-goods merchant, will pass his listless fellows every time.

Such a young man becomes self-reliant. He can easily decide many important things concerning the business for himself. Garfield once said: "The man who dares not follow his own independent judgment, but runs perpetually to others for advice, becomes at last a moral weakling, and an intellectual dwarf."

To give an example: Take the dry-goods salesman, who knows the history and process of silk manufacture, or who is well posted on the cotton industries. It is impossible that he will not attract the attention of his employer. Will not the clerk who knows the process of printing calico, for example, stand a better chance of promotion than the clerk

who is ignorant of everything except what his daily routine compels him to know?

Given a successful business, and there can always be some one found connected with it who is giving it more than the eight or ten hours per day absolutely required. The greatest fortunes ever accumulated were the fruit of great exertion.

Look at Alexander T. Stewart, who landed in this country a poor Irish boy of sixteen, friendless, homeless, and almost penniless, yet he became the dry-goods prince of the world! John Wanamaker began life by working before and after school hours, turning bricks in his father's brickyard. In fact, seventy-three per cent. of the men who have risen to wealth, honor, and distinction in America were once poor boys.

Such men have realized the value of time and have economized. They have improved spare moments. The young man in business must have a good general knowledge, not only of the various features of his own business, but also of banking and exchange in general. He must be posted on the tariff and the money question. In the spare moments he must learn of railroads and their operation, and of methods of doing business. He must know how goods are handled, ordered, shipped, billed, etc.

Again, how many salesmen can tell how a hat is made? Is there one salesman in ten in a hardware store who can tell how a piece of iron is cast? It is only by constant application to one's calling that any remarkable headway can be gained.

Horace Greeley once said: "If any man fancies that there is some easier way of gaining a dollar than by squarely earning it, he has lost the clew to his way through this mortal laby-

rinth, and must henceforth wander as chance may dictate." When a young man has decided to work with a will, he has made a long stride toward success.

Many young men are anxious to start in business for themselves, but realize the impossibility of so doing because of lack of capital. If only chance would give them a few hundred dollars, they think their success would be assured. They forget that man's true position in the world is that which he himself attains. What comes by a chance will go by a chance.

It is only necessary to contrast the thoughts and actions of many salesmen with those of successful merchants to understand how it is that so many of the former fail. Idleness, luxurious living, bad habits and divided energies tell the tale.

It is an old saying that "some men can tickle the earth with a hoe and it will laugh a crop." Indeed some men seem to have almost supernatural success, but we attribute it only to their shrewd business principles, to their intimate knowledge of every aspect of their business, and the consequent ability to drive the best bargains.

The merchant has read the lives of such men as John Jacob Astor and Stephen Girard. He has learned not only how they achieved success, but more important still, the principles on which their success depended. The study of the life of any successful man cannot but be the stimulus to action.

Not all men can be successful or achieve a desired end. Circumstances, over which they have no control, may prevent. Remember, however, that

"Not failure, but low aim, is crime."

CHAPTER X.

SPORTS AND PASTIMES.

With wise forethought, the American parent invariably encourages a desire for manly sports and pastimes in the child. The result of too much study has passed into a proverb — "All work and no play makes Jack a dull boy" — while a judicious admixture of bodily exercise preserves health and renders the mind capable of expansion.

The youth of the present day is a thousand times more fortunate than the youth of fifty years ago. Invention, cheapness of production, and a score of other causes, have brought pastimes to his door which were then unknown, or possible only for rich men's sons.

Divisible into two great classes, outdoor sports and indoor pastimes, the former must necessarily vary somewhat according to locality. Thus ice-boating is not probable as a sport for a Florida boy, nor much boat-sailing for a boy in Oklahoma. Sports necessarily vary with the natural features of each locality.

Well worthy of attention and study is the old-time sport of *archery*. Thus man in olden times was wont to provide his food, and thus to defeat his enemies. The battles of Hastings and Agincourt were won by the profi-

ciency of bowmen, and mighty archers were those semi-legendary heroes *Robin Hood* and William Tell.

In athletics we touch a sport at once supremely ancient and extremely modern. Greece and Rome, with the Olympic and the Isthmian games, bear testimony to the prowess of the runner, the strength of the wrestler, and the skill of the disk thrower.

It was also a remarkable feature of a recent revival of the *Olympic games* in Greece, that an American athlete defeated the Greeks and the world in the purely Greek exercise of throwing the disk.

The game of *baseball*, the national game, is one which few boys neglect to play and at which many become expert. It is a much older game than many suppose. The old Romans in the time of Cæsar played *ball*.

Bicycling bids fair to become the most popular American pastime. It has already proved to be a most potent factor in producing better roads and in causing *bicycle* paths to be built in the suburbs of great cities or leading to attractive scenery. The inventors of the original "boneshaker" and "high wheel" little

thought of the final shape their ideas would take, or how intensely popular the sport would become. Thus a beneficial and most healthful exercise is open to many a toiler, and many a beautiful place on the earth's surface is accessible to his wheel.

It may be said with certainty that there are few more useful accomplishments, and no more healthful and invigorating exercise than that of *swimming*. Many a hero has had occasion to utilize it in saving the lives of his less fortunate fellow men. The story of swimming and the feats of endurance accomplished by it are attractive, and should stimulate all to learn.

Boats figure largely in the history of mankind. First came the tree trunk, hollowed out by the action of fire, in which the rude savage trusted himself to the watery deep. Then came the basket coracle, in which the early Briton fished. It is an interesting pursuit to trace the evolution of the boat from these primitive boats down to the graceful *yacht*, the naphtha launch, and the trim *canoe* of the present day.

The art of sailing a *yacht* is especially interesting to Americans, who have been invariably the victors in every international yacht race.

The English national game of *cricket* is rapidly growing in favor in this country, as it is visited nearly every year by English, Canadian, or Australian cricket teams. The game has an interesting history.

There is also a kindred sport, *football*, usually played in the cooler season of the year. Tradition has it that the origin of the game is founded on the brutal sport of some old-time Saxons, who kicked the head of a slaughtered Dane about the Roodee in the City of Chester. Be that as it may, the game has a great popularity at the present time, and, shorn of its roughness, which the rules are slowly but surely tending to eliminate, it bids fair to be a permanent national pastime.

Bowling, or ten pins, may be almost classed as an indoor pastime, and is of sufficient present-day interest to be well worth a careful study.

Then there is the manly art of self-defense, or *boxing*, which is harmless and healthful, and recognized as useful in teaching a man to defend himself from unjust and unprovoked attack.

It may be that a vacation can well be spent camping out on the shores of some placid lake or historic stream, or by the margin of the sea, where, in the balmiest and most invigorating air, the tired system can recuperate from the effects of a city's heat and noise.

Fishing, the contemplative man's recreation, is also the recognized pastime of the small boy. The myriad waters of America stand open for the exercise of the angler's skill; but he fishes best and most securely who not only knows something of the fish he tries to catch, but also is acquainted with the laws and customs regulating angling.

The Scotchman's game of *golf* has recently made rapid strides in America. Peculiarly interesting are its history, customs, and quaint terms.

Gymnastics open a wide field and one full of ancient history and modern interest. Hygienic to a degree, they are frequently included in the course of instruction given by schools. The limbs and muscles, strengthened by such exercises, are better fitted to fulfil their daily tasks, while the entire human system is permanently benefited by such stimulating exercises.

Polo, *Tennis*, and *Wrestling* have each their place and devotees, and accounts of them can be perused with interest and profit.

Trapping and hunting are subjects near akin, and from the time of *Nimrod*, the mighty hunter of antiquity, they have formed one of the occupations or recreations of men. By

them alone can an exhaustive knowledge of the habits and life of the bird kingdom and animal world be obtained. It was the practise of hunting and trapping for their daily needs that made the minute men of the Revolution such sure shots, and such marksmen as the Kentucky trappers and hunters won the victory at New Orleans by their deadly aim at the red-coats' hearts.

Let us turn to the indoor pastimes and amusements which serve to make pleasant the hours after dark, when the bright fire glows at home, and the crisp frost crackles outside.

Backgammon, checkers, *chess*, and cribbage are near akin, and of high intellectual order as recreations. Each has an interesting history, and one well worthy of perusal and attention.

The acting of charades and private theatricals have made many an evening pleasant. Such pastimes induce self-confidence in speaking in public and also encourage the study of elocution. *Dominoes* are akin to the games which are enumerated above, and they have an ancient history of their own, which is quaint and interesting.

CHAPTER XI.

HOME INFLUENCE.

The child enters life with characteristics handed down to him from his ancestors, but the character with which he will go through life very largely depends upon the training he receives. Any tendency well marked in the child should be taken notice of by the parent, and its leading followed in so far as it tends to no real wrong.

What the child begins life with is his rightful inheritance, and upon that should be built his future.

If, like the little *Benjamin West*, he can show a very good reason why he should have an art education, the duty of his parents is clear. But few children indicate to their parents, as distinctly as did *Mendelssohn* or Clara Fisher, almost in babyhood, the talent they possess.

Oftentimes it may be discovered only after careful and patient study. But the careful and patient study to discover the peculiarity of the child's mind, if there is one—and there must always be some individual bent which distinguishes one child from another—is the duty of every parent, so that his child may be helped to the fullest development of his powers.

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One of the most direct influences in life is that exerted by books, especially those read in the impressionable period of childhood, say from four to fourteen years of age, and if the reading of a child be carefully directed much of his future may be shaped.

No parent can make of a child merely what he wishes him to be. If that were possible, individuality would be stamped out entirely. But the parent may so dominate the growing tendencies as to warp and deform them.

Only the children of remarkable genius, the Handels, the Joshua Reynoldses, and the Wordsworths, have risen above the barriers forged about them and gained their inheritance.

And, in all probability there have been thousands of children whose genius, not of so forceful a type, succumbed to the stronger will and grew but to mediocrity, if allowed to bud at all.

Many a man can recall with reproach the longings and possibilities for larger things he was never assisted to realize. Such a reproach is the bitterest a child can feel. It is a disregard of his divine right.

Thus it is possible, on account of the great authority and guiding power vested in the parent, largely to make or mar a brilliant career for the child.

The common error which busy fathers and mothers fall into in ignoring or rebuking the oft repeated questions of the children, is a frequent source of great wrong.

The development of the reasoning faculties depends upon their activity; and checking the normal activity by discouraging questioning results in dwarfed reasoning powers. The questions of a child may serve as a guide to the individual tastes and ability if taken note of, and always can be made the avenue of instruction. A natural and commonplace inquiry about a colored picture might be the excuse for telling a child the interesting story of Senefelder discovering lithography, or Gutenberg and the art of printing.

In reading to a child one may carefully note what seems to arouse the most interest, what is asked for again, and by making a study of that which appeals most strongly to him, hints of his individual tastes and tendencies may be gained.

A child with a strongly marked tendency for mechanics, often noticeable in early infancy in the passion for wheels, engines, or any kind of machinery, may be helped by the class of reading with which he is supplied and his interest sustained, to become a man of great mechanical ability. But if the hint were not followed, he would probably always retain the leaning in that direction while the power would never be put to practical use.

The stories of the boyhood of *John Smeaton* and his little contrivances, which foretold the ability for his world-famous achievement, would fire the imagination of such a boy and cultivate in him the ambition in line with his peculiar bent, so as to lead him to undertake and to do great things. For if a boy

inherits a taste for mechanics, a mechanic he will be, though it rests much with his parents whether he tinker all his life or thoroughly master his career.

The child is widely separated from the man in his views of life, and in order to understand what seems to the adult the odd or quaint thoughts and habits, one must study the things that interest the child, and endeavor to see life from the child's point of view. If the parent is in sympathy with his child in hopes, ambitions, and interests, the matter of assistance in reading is comparatively simple.

The child with a great love of music and delight in the harmony of sounds, with a parent in sympathy and understanding, leading him through his imagination to delight in the great operas and the themes of the master compositions, may be brought up to the greatest of the talents.

John Sebastian Bach was the descendant of several essentially musical ancestors. His tendency toward music was natural and was encouraged from the first.

The boy with cleverness in his fingers' ends and the constructive faculty evident in the handling of his toys or his choice of amusements, his imagination assisted by the stories of the efforts of such men as *Watt*, *Franklin*, or *Edison*, and his interest in his own little efforts at invention, encouraged by the ambition to emulate the men of whom he reads, may lead him to bring new ideas to the help of the world.

The fondness for tools evinced by nearly every healthy, active child should be encouraged. The principles of carpentry are extremely educative and give scope for much individuality. With simple carpenters' tools, suitable material, and with some judicious help, a boy will work out many ideas which may lead him to serious undertakings.

All reading, however, should not be of too

seriously instructive a character; much should be chosen for the pure pleasure it gives. Unbridled imagination reigns over childhood. Peculiar, and to be pitied, is the child whose life is not peopled with creatures of fancy far more entertaining and instructive than the commonplace human beings among whom he dwells. For that reason stories of *fairies*, dwarfs, and giants, or any folklore tales are the legitimate reading of the young. They are upon the child's plane of development and a food suited to his capacity. He peoples rocks and caves with their mythical denizens and deities, and interprets the great phenomena of nature as did the early races in their *mythology*. Niagara Falls is not simply a great rock wall over which the water rushes, but the sporting ground of water sprites. The Mammoth Cave speaks not of limestone formations, but of fairy palaces and imprisoned princesses. The beautiful tracery of a mirage is a wonderful glimpse into cloudland rather than the refraction of *light*.

The rushing volume of natural gas from the earth may mean a liberated spirit. Geology may be reached by such incipient stages, and is far better learned than in the abstract. The myth of *Prometheus* typifies the value of fire more forcibly than any enumeration of its uses.

Education is a dry affair if bereft of *fable* and symbolism. A child can never be a *Columbus* if he is not allowed to dream of the impossible.

The world's heroes are always fascinating to a child—the element of hero-worship is

strongest in the young—and there need be only a suggestion of interest in the struggles of *Lincoln's* boyhood, the success of *Garfield*, *Andrew Johnson's* unique education, the prowess of *Grant*, or the wonderful career of *Fredrick Douglass*, to make a strong impression for the study of history.

The child lives in the company of his friends of fiction, and, if they be well-bred people, he imitates their manners and marks of culture. Good manners may be taught a child more effectually through the agency of his book-friends than his human friends; they are to him a more inspiring reality, more worthy of emulation, and much easier to imitate.

What the child reads, he becomes, for the time being at least, and it always leaves its impression upon him. When the florist discovers certain characteristics in the plant, he cultivates it for the development of that peculiarity and obtains a variety of new and individual interest, and the parent may make his child an individual variety with marked characteristics by much the same method as the florist cultivates the flower, or he may leave the child unmarked save for the general characteristics of the species.

Let the parent look well to the reading of his child, make a thoughtful study of the path each child should tread, and endeavor to throw all the influences about his early life that will help him in that path, bearing in mind that in the books which his child reads are influences of weighty and lasting character.

CHAPTER XII.

BOOKS AND THEIR AUTHORS.

"These words the Lord spake unto all your assembly in the mount out of the midst of the fire, of the cloud, and of the thick darkness, with a great voice: and he added no more. And he wrote them in two tables of stone, and delivered them unto me."

This event took place about 1450 years B. C., and is undoubtedly the first account we have of a book. Moses brought this stone book down out of the mountain, but when he saw that his people had sinned, he said:—

"And I took the two tables, and cast them out of my two hands, and brake them before your eyes."

It will be remembered, however, that the Lord wrote two more tables for Moses, and these were preserved.

The Chinese claim to have literary monuments which date back to about 2000 years B. C., while the Sanskrit hymns of Veda may be traced to about the same date.

The most ancient monuments of Hebrew literature are contained in the Bible. In the Euphrates valley records of the dynasties were made by a picture-writing system, and we have a record of one dynasty that began about

2200 B. C. Later, characters made up entirely of wedges were used. There are hundreds of copies of inscriptions giving accounts of various campaigns, grammatical tablets, legal documents, chronological tables, accounts of eclipses, and other valuable records. The very bricks of which a palace was built were stamped with the name of the ruling monarch. All such records are known as *cuneiform inscriptions*.

After the Hebrew literature, which will always be preserved in the Old Testament, we have the Greek. The Greek belongs to a different family of languages, the Indo-European, while the Hebrew is one of the Semitic languages.

Homer was the first Greek who wrote books. The Iliad and the Odyssey are his earliest productions. The first describes in a most musical flow of language the siege of Troy, and the second recounts the adventures of Odysseus on the return home from the siege.

It seems very strange to us to-day that in the Greek and in all other literature, poetry was written long before prose, but such is the fact.

The ancient Greek tragedy flourished in the fifth century B. C.

The works of Æschylus, Sophocles, and Euripides were produced at this time.

Comedy arose from the Bacchic festivities. The first comedy flourished about 450 B. C., *Aristophanes* being the principal author.

Herodotus, born about 484 B. C., wrote nine books of history in which he gives an account of the Persian wars. He also treats of nearly every known nation on the globe. Later historians are *Thucydides* and *Xenophon*. The latter wrote the *Anabasis*.

Plato's philosophical writings are the first that have been preserved, though two centuries preceding him were prolific of such writings. *Socrates*, though he wrote nothing, gave a direction to speculation which resulted in the establishment of several schools. Plato (429-347) founded the first at Athens. *Euclid* also founded a Socratic school. *Aristotle* was a pupil of *Plato*, though very unlike him. The range of his writings includes logic, ethics, politics, literature, rhetoric, psychology, zoölogy, botany, mathematics, and physics.

Demosthenes and *Aristotle* were born in the same year, and died in the same year (384-322). The former was perhaps the greatest orator of all times. Athens has been called the nursery of Grecian eloquence. *Æschines* was the ablest opponent of *Demosthenes*, and the contest on the Crown between these two orators gave occasion for their masterpieces.

The Alexandrine period in Greek literature extends from 330-30 B. C. Alexandria and Athens were the two centers of literary activity. Prose superseded poetry, and science was cultivated at the expense of literature. The Epicurean and Stoic schools of Philosophy flourished at Athens. Under the Ptolemies, grammar was ardently pursued at Alexandria. The famous libraries at Alexandria and Athens were collected and the Museum established.

Astronomy, mathematics, and geography were studied with remarkable success at Alexandria. *Euclid* and Archimedes were there at that time.

The period from 30 B. C. to 330 A. D. is known as the Roman period. Rome became the literary center of the world. *Plutarch*, the biographer and essayist, and *Flavius Josephus*, the Jewish historian, lived and wrote at this time. *Ptolemy*, the astronomer and geographer, is the chief name in physical science. The Æsopian fables by *Babrius* were produced during this period.

Constantinople was the literary center from 330-1453 A. D. During this period there was a brief renaissance in poetry and rhetoric, followed by a long decline. Learning grew less and less, and the ancient spark of good taste and originality died out.

Latin literature is divided into three periods: the Archaic, beginning 240 B. C.; the Ciceronian and Augustan Age, beginning 83 B. C.; and the Imperial, beginning A. D. 14.

The first Roman writer was *Andronicus* who translated Homer's *Odyssey* into Latin. *Plautus* (254-184 B. C.), failing in business, started to write comedies. He proved successful, and he lived as a playwright until his death.

Shortly before the death of *Plautus* a young slave was brought from Carthage to Rome by a Roman senator. He was so bright that his master gave him an education and set him free. This young man was *Terence*, who was a writer of favorite comedies.

The next period is known as the Golden Age of Latin literature. Prose writings embraced literature, eloquence, history, jurisprudence, philosophy, and geography.

Cicero, the interpreter and transplant of Grecian culture and refinement, became the creator of a standard prose so refined that it was never surpassed. *Cicero* was a statesman and a lawyer, though his later writings include ethics, philosophy, and religion.

During this period *Julius Cæsar*, historian, grammarian, statesman, and general, wrote his commentaries on the Gallic and civil wars.

Vergil (70-19 B. C.) wrote his eclogues, georgics, which treat of agriculture, domestic animals, culture of trees and bees, and the *Æneid*. The last treats of the fate of *Æneas*, the founder of a second Ilium and indirectly of Rome, and the ancestor of the Julian family.

One of the most important writers of the Augustan Age was *Livy*. He wrote a history of Rome from the foundation of the city.

Horace, whose first attempts were in the line of satires, has always shared with *Vergil* the greatest popularity among all the Roman poets. He wrote odes, epistles, and satires.

The Imperial Age, or the Silver Age of Roman literature, embraced such men as *Seneca*, a brilliant but erratic writer; the elder *Pliny*, a writer on natural history; *Juvenal*, who turned from the pursuits of oratory and war to poetry; and *Tacitus*, the most eminent prose writer of his time.

In the second century *Suetonius* wrote the lives of the twelve Cæsars.

This period, the period of decay, comes to a close about A. D. 500, or perhaps not until the middle of the sixth century, when *Justinian* caused the great *Corpus Juris* to be drawn up.

From the Latin language sprang, among others, the Italian, Spanish, and French. About the twelfth century each of these branches began to develop a national literature.

The Italians present such names as *Dante*, *Petrarch*, and *Boccaccio*. The first produced one of the world's classics, the *Divine Comedy*. Later, *Tasso* wrote *Jerusalem* and some minor poems. *Galileo* was the greatest Italian writer on physical science. He was compelled by an ecclesiastical tribunal to retract his astronom-

ical theories. Considerable Italian history and some philosophy have been written; but on the whole they are not especially remarkable.

The Spanish literature begins properly with the twelfth century. The first works gave utterance to the fierce energy and heroism which animated the Spaniards in their long-continued struggle against the Moors. Songs and romances became the representations of the true national literature of Spain. The poem of the *Cid*, the lord champion of Spain, is the first important literary production.

The illustrious dramatist, *Lope de Vega*, wrote many romances and sonnets in the seventeenth century. *Calderon*, his rival, especially exhibits the imposing grandeur of Spanish religious zeal.

The best model of Spanish prose is the widely read *Don Quixote*, which was written in the first half of the seventeenth century by *Cervantes*. This author, of all Spanish authors, is the best known abroad. In modern times the tendency of Spanish writers is to turn from the present condition of national decay, and write on themes connected with their former glory.

The earliest poems of the French celebrated the illustrious deeds of noble warriors. They are grouped into three cycles, the first relating to Charlemagne, the second to King Arthur and the Round Table, the third to Alexander and the ancient heroes. During the twelfth, thirteenth, and fourteenth centuries was the period of what is called Old French, which was intermediate between the Latin and the present French. Throughout this period various works in allegorical and lyric poetry, history, and drama were written. The most flourishing period was in the thirteenth century. This literature, too, had a tremendous influence upon the literature of Spain, Italy, Germany, and England.

Early in the Renaissance, *Montaigne* (1533-92) wrote his *Essais* and became the founder of a new branch of literature.

Fifty years later *Balzac*, in his letters, gave a valuable expression of society. He was considered the best prose writer of his time. He endeavored, and with success, to improve and refine his native language.

Descartes is accorded the highest place among French philosophers; and *Corneille*, the father of modern tragedy, portrayed in elevated style the noblest elements of character. Contemporaneously with him was that master of a beautiful and elegant style, *Racine*. The poet and actor, *Molière*, wrote a great variety of plays and proved himself a master in comedy.

The eighteenth century produced *Voltaire*. His influence was not confined to France alone but spread over all Europe. His works touch upon almost every department of literature.

Religion and philosophy, the laws and customs of society, were made the objects of the finest pleasantry in the letters of *Montesquieu*.

Rousseau, the reformer, though advocating false theories and unsound philosophy, possessed remarkable eloquence and brilliant style.

The works of *Victor Hugo*, and *Alexander Dumas* of the present century need only be mentioned to be fresh in the minds of all. *Lamartine* and *Béranger* charmed the imagination and delighted the senses. They reached the popular heart with delicate sentiment, wit, and patriotism. France has also produced many writers in political science, criticism, philosophy, and religion.

In history, such men as *Guizot*, *Michelet*, and *Thiers* have won distinction.

Russian literature is a result of the efforts of Peter the Great to raise the standard of his people. For centuries this people had had a distinct language, but no literary works of

value were produced. Men endeavored to copy after Latin, French, and Spanish models. During the nineteenth century some excellent works of a distinctly national character have been produced.

Gogol (1809-52), a native of Little Russia, first wrote short tales, in which he displayed great pathos mingled with humor. His later works, the "Revizor" and "Dead Souls," form the foundation for his fame.

Count Alexis Tolstoi and *Ivan Turgenieff* have been read both at home and abroad. Tolstoi devoted himself to a very careful study of one of the most troublous periods of Russian history. *Tourguenieff* stands in the front rank of Russian novelists.

Of late much attention is being given to Russian history and mythology. Marked advances have also been made in journalism and magazine literature.

The beginnings of German literature were made at the time of the Reformation. Previous to that time there was a church and court literature produced by sporadic efforts. *Charlemagne* caused to be made a collection of popular songs and mythological lore of the German nations.

When the Germans came into contact with the Spanish, French, and English knights in the Crusades, they learned the art of poetry. The lyrics of the Minnesingers and the Meistersingers were the result.

Before the end of the Thirty Years' war, literature began as the business of the educated class. *Martin Opitz*, in 1624, laid the foundation by his book on the "Art of German Poetry."

Kasper von Lohenstein (1635-83) wrote many romances and dramas, full of frivolities and crudities, wild bombast, and violent reverses of fortune. His influence was enormous, and the theater made a step forward.

Not until *Kant* and *Lessing*, however, was

the literature of Germany a complete mirror of civilized life.

Goethe (1749-1832) marks the beginning of the Golden Age of German literature. This period was great in every respect. History, philology, theology, philosophy, and science were cultivated with success and with genius. *Schiller* is a strong figure in this romantic period. Politics and theology are mingled in the lyrical songs. Goethe and Schiller were intimate friends, and in their co-operation actually governed German literature through several years. Goethe's *Faust* gave the inspiration which developed into the Romantic school.

In philosophy the period is represented by *Hegel* and *Schelling*, in history by *Schlosser* and *Ranke*, and in natural science by *Von Humboldt*.

Very little was written which contained truly popular elements. It was the literature of the educated class. *Arndt*, *Börne*, and *Heine* have felt the need of a literature of the people, and have sought for a broad and truly popular principle.

In Scandinavia a literature sprang up at the beginning of the eighteenth century. In science, *Linnaeus* wrote valuable works, and *Swedenborg* contributed to literature proper. Later, *Oxenstiern* drew upon Swedish life and history, and wrote in a truly national strain.

Björnson, in Norway, has written many dramas, and *Oehlenschläger's* work in Denmark has been the key-note of the literature of that country for a century and a half.

"Give me, of every language, first my vigorous English,
Stored with imported wealth, rich in its natural mines,
Grand in its rhythmical cadence, simple for household employment,
Worthy the poet's song, fit for the speech of man."

In the splendid galaxy of English and American literature there are many stars. Of these, we shall be able to mention only a few. We shall consider only those of the first rank; those who represent epochs of literature and marked phases of style. We shall also treat first of the English and then of the American authors.

The earliest representative of modern English was written about 1305 A. D. "The Vision of Piers Plowman" was written about 1362. A little later *John Wycliffe* completed his translation of the Bible. This work enriched English expression and idiom.

Chaucer (died 1400), one of the greatest of English poets, marks the beginning of the literature of importance. He was a member of Parliament, and a man of business as well as of books. His chief works are "The Canterbury Tales," "Troilus and Cresside," and "The Flower and the Leaf." These works put the final touch to the various literary forms that had been developing.

The next period in English literature takes us to the time of *Edmund Spenser*. While this period did not furnish a single great name to English literature, the nation was preparing for great things. During the latter part of the fifteenth century and the first half of the sixteenth there was a great revival of learning, generally known as the Renaissance. The chief cause leading to this revival was the invention of printing by William Caxton in 1474. Up to this time English books were all in manuscript form, and were consequently few and costly. The art of printing multiplied books, and made their wisdom and beauty accessible to the people. The greatest literary activity of the fifteenth century was ballad-making. The early sixteenth century poets paved the way for the great Spenser.

Edmund Spenser (1553-1599) has been called the poet's poet. His great allegory, "The

Faerie Queene," will live through all time. This great poem is a tale of knight-errantry. The hero is King Arthur, and its pages are rich in adventures and figures of romance. Distressed ladies and their champions, combats with dragons and giants, enchanted castles, magic rings, charmed wells, forest hermitages, and the bower of bliss, are the implements of the allegory. Twelve moral virtues are represented, one in each of the twelve books.

The Elizabethan Age began about 1580 and ended in 1670. Queen Elizabeth died in 1603, but the glow and splendor of the literature of her time was inherited by the poets of succeeding reigns. The spirit of this age was characterized by a freshness and delight in living. The poets caught and reflected this spirit. The result was poetry such as has never been equalled in the history of English literature. Among the earliest writers of this period was "*Kü*" *Marlowe*, a dramatist of genius, though at times extravagant and bombastic in style, who wrote such dramas as *Faustus*, *Edward II*, etc.

William Shakespeare left home when about twenty-one years of age and went to London as an adventurer. He began to write plays for a living. It soon developed that the secrets of nature and of man's heart, the depths of wisdom and of philosophy were instinctive in this young man. Tragedy, philosophy, pathos, fancy, and humor were treated equally well by him. Besides the numerous plays, he wrote many sonnets and poems, as *Venus and Adonis*, and *Lucrece*. He retired to Stratford-on-Avon in the prime of life, where he died in 1616.

Shakespeare's contemporaries are many. *Benjamin Jonson*, on whose tomb in Westminster Abbey is the inscription "O rare Ben Jonson!" was of a different school from Shakespeare. His writings were classical and not romantic, pure comedies with no admix-

ture of tragic elements. His first play, *Every Man in His Humor*, was acted in 1598.

No man was more conspicuous in the Elizabethan period than *Lord Bacon*. He is known as "the father of inductive philosophy." The first edition of his essays was published in 1597. Bacon was a great and successful lawyer and a splendid orator. He himself thought his works would be successful, because they "came home to men's business and bosoms." Dr. Johnson said that the wine of Bacon's writings was a dry wine.

Eight years before the death of Shakespeare, *John Milton*, the greatest Englishman, was born. The masters in the high arts are certainly not to be compared generally. It is only when an individual reaches the front rank in more than one department of life that we can say he is greater or greatest.

Milton attained to the front rank in several things. In politics, Milton was secretary of state under Cromwell's ministry, the strongest England ever had. In controversy, he easily led in all Europe and thus brought England, hitherto a rather unnoticed nation, into the front rank of nations. In poetry, Milton was the greatest of his time, and marks an epoch in English literature. One of the foremost of English poems and the sublimest of all epics is his "*Paradise Lost*."

During the next hundred years prose takes precedence over poetry, and the characteristic literature is criticism, satire, and burlesque. However, it was during this time that Sir Isaac Newton made his scientific observations.

Dryden was the first great English satirist, and also a master in controversy. He was the earliest writer, too, of modern literary prose. *Robinson Crusoe* was written in 1719 by Daniel De Foe. Addison began the issue of *The Spectator* in 1711. As an observer of life, of manners, and human character, Addison had no superiors.

Pope had amassed a small fortune by his pen before he was thirty years of age. Though not great in the poetry of nature or of passion, he was a great literary artist, and dominated English poetry for nearly a century.

The characteristic poem of the middle of the eighteenth century was Gray's *Elegy* written in a Country Churchyard. *Samuel Johnson*, however, was the central figure of this period. He was the typical John Bull, rugged, eccentric, and self-developed. His social wit and power as a talker attracted such friends as *Oliver Goldsmith*, *Edmund Burke*, the orator and statesman, and *David Garrick*, the actor.

We come next to a new era in English poetry—a revolution in literary taste. For nearly a hundred years poetry had dealt with the life and manners of towns. The theme changed to nature, with a lively sense for what is new and untried. The romantic artist seeks new subjects and insists on freedom in handling them. Man is considered as a universal being and independent of place or circumstances. *Crabbe* and *Cowper* were the first of importance to write in the new strain.

Robert Burns was born in 1759, on the banks of the "bonny Doon" not far from "Alloway's auld haunted kirk," where Tam O'Shanter saw the witches' dance. For the first time the Scottish vernacular poetry was heard beyond the border. His accurate observation and first-hand description of flowers, landscapes, and animals just about him, gave rise to a new spirit in the interpretation of nature. Passion, human personality, freedom, and humanity are basic elements in Burns's poetry.

Walter Scott, the poet of chivalry and romance, was born in 1771. His poetry as a whole is a set of romantic tales and a few ballads and lyrics. He was at ease in doing work, and also had excellent ability to see and tell what he saw in a plain manner. *Wordsworth*,

Byron, *Keats*, and others also characterize this period.

The literature of the next sixty or seventy years will occupy us for a few moments only, although, beyond a doubt, history will accord its authors as high a place as any that we have considered.

Charles Dickens (1812-1870) was raised suddenly to fame by the "Pickwick Papers." His intimate knowledge of men and things of his time contributed materially to his success.

Thackeray, when twenty-five years old, applied to Dickens for the position as illustrator of "Pickwick Papers," but was refused. Dickens little thought that this young man would some day be the author of "Vanity Fair."

Macaulay (1800-1859), as a writer on historical and biographical subjects, had no superior. He also wrote many essays and was prominent in public life.

In 1830 *Alfred Tennyson* published his first volume of poems. Gradually the scope of his work was broadened, and he treated romantic and classic subjects. He acquired an expressive treatment of landscapes as is shown in the *lotus land*, "in which it seemed always afternoon." His most intellectual and individual work was "In Memoriam," an elegy on his friend, *Hallam*.

Without mentioning any of the English authors who are alive to-day, nor indeed other prominent ones of the past, let us turn to those who are the products of the American continent.

In the early colonial times the people looked to the mother country for intellectual nutriment as well as for political authority. Moreover the young communities were unfavorable to original literary production. The wants of the hour and the exigencies of practical responsibility wholly engaged the mind. But with the progress of the country, and the in-

creased leisure and means of education, the literary spirit developed. The names of *Jonathan Edwards* and Benjamin Franklin were echoed abroad. A characteristic vein, an individuality of thought, and a local significance, began to supplant the imitative productions.

The intellect of the country first developed in a theological form. The clergy were the best educated and most influential class.

They had a controlling voice in political and social as well as religious affairs. Besides Jonathan Edwards there were Roger Williams, Increase Mather, Cotton Mather, and John Eliot.

Benjamin Franklin (1706-1790), the first general writer of any special note, began active life as a printer. He took naturally to books, and at the age of seventeen ran away from home and went to Philadelphia. From here he went to London on an errand, and lived there for a year and a half. On his return he organized a social and literary club which afterward developed into the American Philosophical Society. In 1732 Franklin began the publication of "Poor Richard's Almanac." This work was published annually for a quarter of a century. In 1758 he published "The Way to Wealth"—a collection of the maxims of temperance, health, and good fortune, previously printed in the Almanac. Franklin also wrote an autobiography.

American eloquence, although not unknown in the professional spheres of colonial life, developed with originality and richness at the epoch of the Revolution. It has been said that "oratory is eminently the literature of republics." *Patrick Henry* and *Daniel Webster* are typical American orators.

In history, *Washington Irving* and *George Bancroft* have glorified their native country. The former, a popular and capable writer, was clear and animated in narration, and graphic

in descriptive episodes. The latter reduced the chaotic but rich materials of American history to order, beauty, and moral significance.

William Cullen Bryant (1794-1878) wrote much of his best poetry before he was thirty years of age. His accurate interpretation of the subtlest moods of nature and his loftiness of imagination are alone sufficient to place him in the front rank of American poets.

Boston became the literary center of the country in 1840 and remained so until the war for the Union. Here *Ralph Waldo Emerson* lent his personal influence and inspiration. After the publication of his *Essays* (1841-1844), his home at Concord became the cynosure of many literary pilgrims. Emerson's prose is much more important than his poetry.

Nathaniel Hawthorne surpassed all his contemporaries in the field of prose fiction. Although an office-holder and a man of affairs, he pictures life in "the moonlight of romance." His "*Scarlet Letter*" (1850) will be read in all time to come.

The poet who awakened a love of beauty and a taste for pure art was *Longfellow*. For his themes he goes into the past, and presents very little of the life of his own day. Somewhat in contrast to Longfellow is *James Russell Lowell*. He goes deeply into the great problems of his time—especially the great struggle with slavery. He gives a first-hand observation of things, and his works are free from a bookish tone.

Whittier has been called the "poet-laureate of abolitionism." His greatest characteristic is his lyric and idyllic poetry. *Oliver Wendell Holmes*, *Edgar Allan Poe*, and *Walt Whitman* belonged to this noted group of American writers. These, with Emerson, Hawthorne, Longfellow, Whittier, and Lowell, were all born within a period of sixteen years. They have done not only a service in their own

time, but have also created monuments in the field of literature which will be as enduring as time.

We are sorely tempted to mention a few of the writers of the present day. There are many distinctive writers of great ability, nor

are they confined to any one particular field or style. Many of these writers are well known in every country in the world where the English language is spoken. Let no American fear for the literary progress of his country!

CHAPTER XIII.

THE ARTS.

It is our purpose to review not those arts which are intended to produce material results, known as the useful arts, but rather those intended to produce æsthetic results. Artisans and mechanics will find interesting material in the chapter on HANDICRAFTS.

Aside from the arts of the races of Egypt and the East, the history of the manual arts of sculpture, painting, and architecture fall naturally into four periods.

Sculpture was a favorite art with the Egyptians. As Bunsen says: "Egypt is the monumental land of the earth." The art of that country arose chiefly out of the latter part of religion. The preservation of the body or the likeness of the dead was essential in the estimation of every Egyptian. Hence arose mummification and also portrait sculpture for burial, and monumental sculpture for display. We may find many incidents of every-day life depicted on the walls of Egyptian tombs.

The monumental architecture of Egypt was likewise encouraged by the same desire for permanence. The nature of the art of this country was determined largely by the quantity of the harder rocks easily available. The

Egyptians also took much pride in the carving in wood which they made in the mummy cases.

The Chaldeans lived in a stoneless country and so they used clay for modeling. They invented the potter's wheel at an early date and learned the process of enameling. They imported some stone for sculpturing. Their temples were solid staged towers of sun-dried brick, raised above the mists of the plains.

They made the forms of winged men and animals to represent certain demons and spirits. The figures of angels also come to us from Chaldea.

The arts of the Assyrians were borrowed from the Chaldeans. The Phœnicians borrowed their arts partly from Egypt and partly from Assyria. Though the Phœnicians were inartistic themselves, they spread the art of other nations throughout the countries bordering on the Mediterranean, for their trading ships passed to every part of the known world.

The Greeks were thus brought in touch with the works of art made by the Egyptians and the peoples of the East.

At this time began the first of the four

periods mentioned above. We may call it the Greek and Roman period, from about 700 B.C. to 400 A.D. The other periods are the Christian period, from 400 to 1260 in Italy, and about 1460 in Northern Europe; the Renaissance period till about 1620; and the modern period.

Previous to the Persian wars Greek sculpture was closely modeled after that of the countries of the East. Until that time it was merely a symbolical art. For a long time the influence of the priesthood cramped and fettered the efforts of Greek genius. In time, however, these fetters were burst asunder, and from that moment to the culminating point of Greek art in the age of Pericles, the onward and upward progress of sculpture was rapid and continuous. The perfection of sculpture was reached in *Phidias* and his contemporaries about 400 B.C. The next century saw Grecian supremacy pass from Athens to Sparta. This period is characterized by the less severe design, more refined execution, and the more voluptuous forms of *Praxiteles* and his followers.

This great revolution was followed by a period of decay in which slavish imitators and rash innovators held sway. Thus with the actual fall of Greece we see the decline of the art which was the true reflection of her national spirit. The story of her sculpture is but the history of Greece. In its enduring marbles were enshrined the deities worshiped by the ancients, the monarchs who conquered nations, and the fair women for whose affections the heroes strove.

The breaking up of the great empire founded by Alexander the Great was completed by the capture of Corinth in 146 B.C. Many of the noblest monuments of Greece were destroyed, and a vast number of the works of art were carried by their conquerors to Rome. There art was encouraged by the Cæsars and many Greek artists were invited to locate in Rome.

The reigns of Trajan, Hadrian, and the Antonines form the golden age of the art of Rome. After about 200 A.D., however, sculpture began to decline at Rome, and the removal of the imperial court to Constantinople in 330 gave it a deathblow.

The successive waves of barbarian invasion that rolled over Italy effectually prevented any revival of art. The long night of the Dark Ages in which the greater part of Europe was involved in darkness and ignorance, and a prey to brute force, seemed to have extinguished not only arts, but learning and laws as well.

Early in the thirteenth century art began to revive in Italy. In the cathedrals of Pisa, Siena, Orvieto, and Lucca this period is represented by many works exhibiting rare qualities of beauty of expression. In the fifteenth and sixteenth centuries the great Italian school made marvelous progress. Among the most distinguished sculptors was *Lorenzo Ghiberti*, who won the prize offered for the best models for one of the bronze doors of the baptistry of San Giovanni, at Florence. Michael Angelo declared that, "They were worthy to be the gates of Paradise."

There were many noted contemporaries of Ghiberti, but the greatest name as a sculptor in the history of Italian and of modern art, justly belongs to *Michael Angelo*. This great sculptor is equally remarkable for his inventive power and for the striking character of his execution. He despised the use of the clay model and grappled at once with the marble block before him, shaping it in his imagination, and hewing out with rapid chisel the fervid conceptions of his mind.

With the death of Angelo began the decline both of sculpture and painting. Until the eighteenth century art had ceased alike to deserve and to receive public encouragement, and fell into a state of lethargy, from which

it was aroused only by the taste and genius of *Canova*. The honor of restoring modern sculpture to truer principles and purer taste is also due in part to *John Flaxman* in England. *Bartolini* ranks next to *Canova* among modern Italian sculptors.

In France, the influence of *Benvenuto Cellini*, who started the native school early in the sixteenth century, was long supreme. In 1886 *M. Bartholdi* completed a very noble colossal figure of Liberty, which was presented to the United States and erected at the entrance of New York harbor.

In Germany, *Thorwaldsen*, a contemporary of *Canova*, is most honored as a sculptor. *John Gibson* is one of the most distinguished English sculptors of modern times.

Among the early American sculptors *Hiram Powers* and *Thomas Crawford* are the most distinguished. Powers's "Greek Slave" represents a high type of beauty. Among the living sculptors of national repute are *August St. Gaudens* and *Frederick Mc Monnies*.

The impulse to decorate useful articles is one common to all mankind. *Painting* was not, in its origin, a distinctive art. It was employed in subservience to sculpture. Rude idols were colored in imitation of life, or rude outlines incised in wood or stone were filled up with spaces of color sharply separated and clearly distinguished.

Thus we find that until modern times the history of painting follows very closely that of sculpture. The Egyptians are said to have known the art of painting in the thirty-fifth century B. C. They were acquainted with several colors and with them painted the tombs and other ancient monuments.

The Assyrians, like the Egyptians, practised the art of painting as a matter of record and a decoration rather than an imitation of nature. They enlarged upon the Egyptian painting, and the Hebrews made it rich in material.

The Greeks claim to have discovered painting through the love-sick Kora, daughter of a porter of Sicyon, who traced on a wall the shadow of the face of her departing lover, about to set out on a long voyage. The essential principles of the art were finally established by Polignotos of Thasos. Form, expression, and color were firmly fixed at that time.

The artists of the Alexandrian period which followed, added more perfect imitation, more harmonious color, and more dramatic fidelity of composition. About a century after Polignotos appeared Apollodoros, the Athenian.

Pliny relates a story of the competition between two great painters, Zeuxis and Parrhasios, of Ephesus. Zeuxis painted a bunch of grapes so natural in appearance, so juicy-like, and so inviting, that the birds came to peck at them. He then asked Parrhasios in his turn to raise the curtain covering his performance. But the supposed curtain was the picture itself. Zeuxis declared himself vanquished, saying, "Zeuxis has deceived birds, but Parrhasios has deceived Zeuxis himself."

Of all the great painters of the Alexandrian period none outshone *Apelles*. It is said that a cobbler once picked out an error in the drawing of a shoe in one of his pictures and he corrected it. Then the cobbler took it upon himself to criticise the leg, and received from the artist the famous reply, "Let not the shoemaker go beyond his shoe."

With the death of *Apelles* began the decline of art in Greece. *Etruscan art* was in the main borrowed from Greece. Pliny speaks of the perfection of Etruscan art and the brilliancy of the colors on the walls of ruined temples older than Rome itself.

Rome never had in ancient times an art that was indigenous, nor did she have a painter worthy of note. With the conquest of Greece by Rome a great number of artists went to

Rome and thus arose the Roman art. The skill of Roman artists was in the decorations, in the use of colors, and perspective. Like sculpture, painting declined with the barbarian invasions from the north.

With sculpture, painting declined and with it revived in the thirteenth century. The Crusades, and especially the Latin conquest of Constantinople, once more brought the Romans and Greeks into contact.

Giovanni Cimabue, born at Florence in 1240, is generally regarded as the father of modern painting. One of the most famous of his pictures was carried in a procession with trumpets sounding and banners displayed, through the streets of Florence. Much of the artistic talent of that time was displayed in frescoes in churches and cathedrales.

Giotto, a pupil of Cimabue, effected a mighty revolution in art, and the force of his example extended far beyond his own time. The whole of Italy, from Padua and Verona to Gaeta and Naples, is indebted to him for various works and for a new impulse in art. He was, like many of the great artists of the medieval period, sculptor and architect as well as painter.

During the next hundred years there are several artists of note and the great work of the century is the Dominican frescoes. The latter half of the fifteenth century saw the birth of *Leonardo da Vinci*, *Michael Angelo*, *Raphael*, and *Titian*—the four greatest names in Italian art. They carried the art of painting to a degree of excellence that has never since been equaled. It was the golden age of painting. *Leonardo da Vinci*, the son of a lawyer, was painter, architect, sculptor, mathematician, engineer, chemist, anatomist, poet, and musician.

Michael Angelo was likewise a painter, sculptor, architect, anatomist, and poet, and excelled in all.

Raphael, one of the greatest painters that ever lived, was born among the laurel woods of the Umbrian Mountains. He went to Florence and entered the field of art at the time the works of *Michael Angelo* and *Vinci* were attracting the attention of all Italy. This wonderful artist died at the age of thirty-seven, but his success during the twenty years of his career as an artist has made his name a household word among all lovers of art.

Titian, or *Tiziano Vecelli*, the Venetian, became the most popular portrait painter in Italy. Popes, emperors, and princes contended for the honor of being immortalized by his magic pencil. Following *Titian* in the school of Venice were *Correggio* and *Veronese*.

The period between 1452 and 1666 embraces nearly the whole of the great era of painting in Italy. All before is growth, all beyond is decay.

In the north the central school of early Flemish painting was Bruges. From this school the improved method of oil painting was carried to Venice by *Antonello*, of Messina, before the time of *Titian*. The Flemish classical school began with *Rubens* and *Vandyck* in the early part of the seventeenth century. Of *Rubens*, Sir *Joshua Reynolds* said: "Those who cannot see the extraordinary merit of this great painter, either have a narrow conception of the variety of art, or are led away by the affectation of approving nothing but what comes from the Italian school."

Rembrandt in Holland was the most eminent of the numerous painters of the seventeenth century. His great characteristic was the management of *chiaroscuro*. He carried this feature to the utmost point that has ever been attained. He admitted but little light, but gave to that little unrivaled brilliancy. *Rembrandt* was also a celebrated etcher.

Ingres, the leader of the classical French school, was a close follower of *Raphael*. *Dur-*

ing the reigns of Louis XV and Louis XVI art in France was in a most corrupt and degraded state and so it remained until it was raised by the vigorous hand of *Jacques Louis David* in the early part of the present century. He brought about a strong pseudo-classical reaction which lasted until about 1825 when the romantic school superseded it. This modern school embraces such names as *Paul Delaroche*, the landscape and historical painter, and *Jean François Millet*, the peasant painter. Under these men modern French art has arisen to a great pitch of technical excellence.

Previous to the time of Henry VIII, painting had made little progress in Great Britain. Artists were ranked with the menials of the court, and in fact they deserved little more. The young, learned, and gallant Henry VIII was ambitious to rival the continental courts in splendor and magnificence. Foreign artists were invited, and many continental art collections were purchased outright.

Native artists sprang up, but it was not until the eighteenth century that any extraordinary English art appeared. *Sir Joshua Reynolds*, the first president of the Royal Academy of London, did much to improve and elevate the art of painting in England. Other distinctly national British artists were *Turner*, the landscape painter, *David Wilkie*, and *Sir Edward Landseer*, the famous animal painter. Of the present day artists of England *Millais* and *Leighton* are the most popular.

Benjamin West was the first American to gain an eminent position as a painter. His work was done principally in Rome and England. *Rembrandt Peale* was another artist of the early part of the nineteenth century. His great work was in portraits.

Since 1863 there has been a rapid and vigorous art development in the United States. It is largely the product of French education and a large proportion of the paintings are French

in style. *Eastman Johnson* has for his favorite subjects American rural life, though of late years he has devoted himself to portrait painting. *Bierstadt* is noted for his pictures of the western mountains. *Frederick E. Church* and *William H. Beard* are also well known artists.

The history of architecture may be said to begin with the construction of the *Pyramids* of Egypt about 5,000 years ago. About 2570 B. C. a form of structure is found in Egypt which contains the germ of a style practised at a later age in Greece.

Assyria comes next to Egypt for the age and importance of its buildings. The Persians borrowed the style of the Assyrians but erected their buildings in stone, while the Assyrians were obliged to use wood.

Ancient Greek architecture is almost wholly represented by temples and theaters. The ruins show that the architecture was of a very refined character. The Grecian style embraces three orders, called the *Doric*, the *Ionic*, and the *Corinthian*.

The Romans borrowed their early architecture from that of Greece and Etruria. In Egypt, Assyria, and Greece, architecture was confined to tombs, temples, palaces, and theaters, but the Romans extended it to baths, bridges, aqueducts, arches, and domestic buildings.

To the three orders of Grecian style the Romans added the *Tuscan* and *Composite*. In many of their buildings, such as the *Colosseum*, built about 80 A. D., the orders were piled over each other, dividing the great height of the external wall into several tiers or stories.

Romanesque architecture is the general term applied to all the various round-arched styles which arose in Western Europe after the eruptions of the barbarians.

The *Norman* style, also called *Romanesque*, is very well known in England and Scotland, and many examples of it remain. Under the

general term *Gothic Architecture*, the Norman style is sometimes included, but the name Gothic is understood to mean the pointed styles of architecture, which succeeded the Romanesque and Norman.

Roman or classic architecture may be said to have never died out in Rome, and when in the fifteenth century, the revival of classic literature and taste took place, the ancient classic style of architecture naturally revived along with it. This is called *Renaissance architecture*.

The Arabian or Moorish style of architecture drew to some extent from the Persian and from the Roman Byzantine art. Several mosques and other buildings at Cairo, a peculiar class of houses in Algiers, and the Moorish palace of the *Alhambra*, as well as the mosque of Cordova, furnish striking illustrations of this kind of architecture.

Modern architecture is essentially imitative. In the beginning of the nineteenth century the habit of imitating ancient styles had been established, and began to be applied to Gothic

architecture. In France, the birthplace of Gothic, a modification of the Renaissance, known as the "French style," is used. In Italy and Germany the purer classic examples have been more frequently followed.

The architecture of America follows very much the same course as that of Europe. The churches are often Gothic, but the other great edifices are in the main Italian, such as the capitols of New York, Ohio, and the national capitol at Washington. The last is a building of great size and picturesque outline and depends largely for its chief effect on the lavish use of porticoes and colonnades. In closing it would not be proper to omit mention of those wonderful white palaces which decked the shores of Lake Michigan during the *World's Columbian Exposition* in 1893.

The creation of the "Rainbow City" at the *Pan-American Exposition* at Buffalo, in 1901, introduced something new into American architecture in the blending of colors with architectural design. This produced an effect remarkable in its beauty.

CHAPTER XIV.

CHRONOLOGY.

PERIOD I.

PRIOR TO B. C. 2348 — FROM THE CREATION
TO THE FLOOD.

According to Biblical chronology, the date of creation is about 4004 years B. C., while scientists place it all the way from 10,000 to 30,000 years back, and some of them even millions of years. Prehistoric time has been classified by scientific authorities into four ages, namely, the Palæolithic, or Early Stone Age, the Neolithic, or Polished Stone Age, the Bronze Age, and the Iron Age. Geological research has demonstrated the existence, during the prehistoric period, of huge winged lizards and other monsters belonging to a period distinct from the present.

The first great event after the creation was the Flood. Scientists and theologians agree that a wide-spread deluge at some time occurred, and Scripture places the date at 2348 B. C. Mythological traditions of Babylon, Greece, India, China, our own Indians, and other nations contain numerous references to a great flood.

PERIOD II.

B. C. 2348 to B. C. 1451 — FROM THE FLOOD TO
THE JEWISH ENTRY INTO CANAAN.

There were eight survivors of the Flood, consisting of Noah and his family. The ark rested on Mount Ararat in Armenia, the locality of the recent Turkish atrocities. The human race multiplied, and Scripture records that near the site of Babylon they attempted to build a tower which should reach to heaven, but which only resulted in a confusion of tongues and the consequent diversification of the forms of language and the types of race among men. The founding of Babylon by Nimrod and of Nineveh by Assur followed; Semiramis is said to have surrounded the former with the mighty walls which were the wonder of the ancient world. About this time Menes (the Misraim of Scripture) reigned in Egypt.

What is known as "Abraham's call" (to establish a new nation) occurred in 1921, and his grandson Joseph, who was sold into Egypt by his brethren in 1729, consummated the great commission. Moses, after the death of

Joseph, led the exodus of the children of Israel from the land of Egypt, in 1491, although Joshua, upon the death of Moses, finally guided the Israelites into the "promised land."

The Scriptural accounts of this era are sustained by the hieroglyphics of Egypt.

Athens and Troy were founded (the former in 1556, the date of the latter uncertain) and the glorious city of Corinth was built in 1350. About the same time the foundation of Thebes was laid by Cadmus. The Olympic Games were first celebrated in Greece in 1453.

PERIOD III.

B. C. 1451 to B. C. 776—THE HEROIC AGES TO THE FIRST OLYMPIAD.

The heroic ages followed, lighted by the genius of Minos, the lawgiver of Crete with its hundred cities. In 1263 the Argonauts sailed in search of the Golden Fleece; Tyre was built in 1257; Latinus in 1239 began to reign in Italy; the Trojan war began by the rape of Helen in 1204; Lycurgus, the great lawgiver, flourished in the ninth century; Homer's poems were brought from Asia to Greece in 884; Dido built Carthage in the same era; and the triumph of Coræbus in the race of kings at Corinth, in 776, established the first authentic date in Greek history.

About 1249 Gideon was a judge in Israel; Samson was born in 1155; Jephthah was a judge in Israel in 1099; in 1079 Saul began to reign as king of Israel; David succeeded him in 1055, and Solomon, his son, built the Temple at Jerusalem in 1012, the glory of the Jewish race declining with the closing of his reign, only to reappear for a time under Jeroboam.

PERIOD IV.

B. C. 776 to B. C. 4—THE FOUNDING OF ROME TO THE BIRTH OF CHRIST.

Whatever there may be in the story of Romulus and Remus and the Wolf, it is reason-

ably certain that Rome was founded about 752. Four years later the legend of the abduction of the Sabine women takes its date. In 658 the Byzantine Empire was founded; in 637 Draço, the stern lawmaker of Athens, flourished; in 504 Solon, the Athenian lawgiver, came into power, and in 507 the Pythian games were established at Delphi, the seat of the famous oracle. Following not long upon this event reigned the fabulously rich king Cræsus, and contemporaneously with him lived and taught the Chinese philosopher Confucius, and about the same time reigned Pisistratus, tyrant of Athens. The lyric poet Pindar and the tragic poet Æschylus flourished. Tarquinius Superbus extended his conquests and his cruelties, and the armies of Darius, Cambyses, and Cyrus desolated the earth. In 496 was fought the notable battle of Lake Regillus; in 490 occurred the decisive battle of Marathon; Miltiades died in prison; Xerxes ascended the throne of Persia; Coriolanus was banished from Rome, and Aristides the Just was ostracized.

The battle of Thermopylæ, where the heroic Spartans defended the famous pass, and the naval battle of Salamis, won by the Greeks, were both fought in 480. In 471 Themistocles was banished and in 448 Virginia was sacrificed by her father, and the decemvirs of Rome were abolished; Pericles flourished about 430; the Retreat of the Ten Thousand Greeks occurred in 400; the Romans drained the Alban Lake, and the Gauls under Brennus took Rome.

This was the era of Philip of Macedon (born 382, died 336) and of his son Alexander the Great (born 356, died 323), the latter of whom in thirty-three brief years developed into the conqueror of the world.

The famous library of Alexandria was founded in 283 and the Achæan League began; silver money was first coined in Rome in 268,

and the first Punic war began in 238. Hannibal (born 247) won glory in his great campaigns; Fabius Maximus flourished; the battle of Cannæ was fought; Judea was conquered by Antiochus the Great; the elder Cato flourished; Jerusalem was destroyed. Carthage was overthrown; the Gracchi flourished and fell; Jugurtha starved to death in Rome; Mithridates reigned and the Roman capitol was burned.

Cicero (born 106) became famous as an orator, and Cæsar (born 100) gained glory by his campaigns, Pompey fought, and Catiline conspired; the battle of Pharsalia was fought and the Alexandrian Library burned B. C. 48.

In the year 31 B. C. occurred the battle of Actium, and the year following Mark Antony and Cleopatra died.

The Scriptural events of this period were: the captivity of the Israelites in 721, and the end of their rule at the hands of Salmanasar, the invasion of Judea by Sennacherib, king of Assyria; the prophesying of Habakkuk; the killing of Holofernes by Judith; the uniting of the kingdoms of Babylon and Assyria by Esarhaddon; and Nebuchadnezzar's capture of Jerusalem and the beginning of the Jewish captivity.

PERIOD V.

B. C. 4 TO A. D. 1096—THE BIRTH OF CHRIST TO THE FIRST CRUSADE.

Jesus Christ was crucified under the reign of Tiberius Cæsar and the governorship of Pontius Pilate. The year 25 A. D. marked the end of the Olympiads, and in this year John the Baptist preached in the wilderness, telling of the near approach of the reign of the Messiah. Christ appeared and was baptized by John, after which he began preaching and performing deeds of beneficence and miracles in Judea. After three years of such

work he was crucified, and the third day he rose again according to the Scripture. The record of his life and deeds is embodied in the several books of the New Testament.

Caligula, Claudius, and Nero ruled successively over pagan Rome. Boadicea was scourged; Seneca and Lucan were put to death. Titus took Jerusalem amid a scene of horror such as the world has never known, among which were mothers eating their own children and men hanging crucified along the highways by the hundreds of thousands.

Galba, Otho, Vitellius, Vespasian, and Titus successively ruled in Rome. The persecution of Christians began, and, forbidden to assemble, they dug subterranean retreats, called catacombs, where they gathered and subsisted by thousands.

The Roman legions, in their conquering progress northward, invaded Britain, building walls, forts, and military roads.

The power of Rome was on the wane. The Saracen race appeared on the theater of European affairs. The Temple of Diana at Ephesus was burned in the year 260. Diocletian persecuted the Christians.

Constantine the Great, who ushered in a new era for the Christians, issued in 313 his famous Edict of Milan, embracing a policy of toleration toward them. The same monarch abolished combats by gladiators, called the Council of Nicea in 315; established Sunday; and was baptized into the Christian faith just before his death.

The Goths, Huns, and Vandals now began to make incursions into Roman territory, and finally took and sacked Rome itself. Attila—"the Scourge of God"—marched over Europe and spread terror in his path. The Franks under Clovis embraced Christianity, and the Saxons began to ravage the coasts of Britain.

Mohammed (born in 571) became a marvelous force in the then civilized world. The

Persians took Jerusalem in 616, and the Saracens in 636. The latter held it for over 450 years, their possession eventually resulting in the Crusades. The Mohammedans or Saracens gained control of Spain and a part of Gaul. They would have completely overrun Europe but for the terrible defeat they encountered at Tours in 732, at the hands of Charles Martel, the grandfather of Charlemagne. The latter was born in 742, and inherited from his father, Pepin the Short, the Frankish throne, the power of which, in his hands, extended over all Europe.

In 778 occurred the battle of Roncesvalles, told in history and sung in legendary song, in which Roland, the paladin of Charlemagne, fell at the hands of the Moors.

The Saxon Heptarchy in England began in 827, and the West Saxons gradually gained the ascendancy until 871, when Alfred, the West Saxon king, became monarch of all England, winning by his wise and benignant rule the title of Alfred the Great. With him begins the reliable record of modern English history. The Danes had been for years making predatory raids with their war-ships on the coasts of England, and in 1016 they succeeded in placing their king, Canute, on the English throne.

The Normans, under Duke William of Normandy, at the battle of Hastings in 1066, made the conquest of England, and William became its king, and initiated an era of glory for the realm. He introduced the feudal system and compiled the Domesday Book.

In the year 1094 Peter the Hermit began to preach the first crusade, in which the chivalry of Europe enlisted with an ardor unknown in the history of civilization. France, Germany, Spain, England, and the Italian states all sent forth their best blood to rescue the tomb of the Saviour from the hands of the Saracens.

The Turcomans, a tribe of Tartars, made in 760 their first incursion into Armenia from their mountain fastnesses in Central Asia, and obtained possession of a part of Armenian territory, of which they completed the conquest in the thirteenth century, and which they have held uninterruptedly with a bloody and iron grip until the present day of terrible disaster for its devoted inhabitants.

PERIOD VI.

A. D. 1097 TO A. D. 1400—CHIVALRY AND THE CRUSADES.

In 1098 the Crusaders took Antioch; Henry I, son of the Conqueror, became king of England in 1100; in 1118 the powerful order of Knights Templar was instituted; in 1135 Stephen succeeded Henry on the English throne; David I of Scotland lost in 1138 the "Battle of the Standard;" the Bank of Venice was founded in 1157, and became a great commercial power.

Thomas à Becket was foully assassinated in Canterbury Cathedral in 1170, for which deed Henry II did royal penance; the conquest of Ireland was begun by Henry II in 1172, lasting through weary centuries; and the Sultan Saladin captured Jerusalem in 1187.

Richard of the Lion Heart left the throne of England in 1190 to join the vast crusading hosts; in 1192 the superb Saladin was defeated in the battle of Ascalon; the chivalrous Baldwin, count of Flanders, in 1203 took Constantinople, and the next year achieved the glory of being crowned Emperor of the East; he received, however, only about a fourth part of the empire—Constantinople and Thrace—the Venetians obtaining the greater share.

In 1206 Genghis Khan burst like a storm-cloud on the eastern horizon and overran the Saracens with his Tartar hordes; and King

John of England, as inglorious a monarch as his brother Richard was glorious, was forced by the Barons at Runnymede in 1215 to sign the Magna Charta, England's first step toward a constitution.

The year 1245 was marked by the important movement of the organization of the Hanseatic League of German Free Cities, constituting the germs of the present commercial power of Germany and Holland.

Dante, the great Italian poet, died at Florence in 1265; and the brave and unsullied Louis IX of France, toward the close of the last crusade, in which he had taken a noble part, sealed his sublime faith by his death in Tunis in 1270.

The year 1280 was the period when Othman (or Osman) took the Turkish scepter and built up a great nation; and in 1282 occurred the horror of the "Sicilian Vespers," the massacre of the French in Sicily.

In 1298 William Wallace was defeated at Falkirk; the heroic Robert Bruce became king of Scotland in 1306; and the next year, a year of heroism, the Swiss cantons, having five years previously thrown off the Austrian yoke, organized a confederation of republics.

There was fought in 1314 the memorable battle of Bannockburn; the mariner's compass, which had been in use for ages in China, was introduced about this time into Naples; cannon were first used by the English in 1327; two years afterward Tamerlane, the great conqueror, began his ravages in Khorassan; and the monk Schwarz invented gunpowder in 1320.

Edward III and the Black Prince made 1346 a red-letter year in English history by winning undying honors at the hotly contested battle of Crécy; ten years later the French King John, called "the Good," was captured by the Black Prince at Poitiers and taken, a royal captive to England and held

for ransom; and the same year Amurath I ascended the Ottoman throne.

Wycliffe caused the year 1380 to be remembered by the lovers of the Bible by translating it into English; Bajazet, the wisest ruler of the Turks, ascended their throne in 1389; and a year before the close of the century Henry IV was crowned king of England.

PERIOD VII.

1400 A. D. TO 1500 A. D.—THE INVENTION OF PRINTING AND THE DISCOVERY OF AMERICA.

Tamerlane, renowned in story and song, died in 1405; the battle of Agincourt, in which Henry V, the chivalrous "Prince Hal," won such a mighty victory over the great French army as to throw all France into the hands of England, was fought in the memorable year 1415; in the second year John Huss of Bohemia was burned at the stake, and in 1416 his associate, Jerome of Prague, met his death in the same way.

Paper was first made from linen rags in 1417; the Portuguese, never tiring of making new quests on the sea, discovered in 1420 the island of Madeira; in that darkened year for France, 1429, when she seemed ready to fall a helpless victim to English greed of conquest, Joan of Arc, the virgin heroine, inspired Charles the Seventh of France to gain such a victory at the siege of Orleans as to entitle him to be called "the Victorious." The Medici family in 1434 entered upon that career of genius and ambition which made them leaders in the world of art, letters, and diplomacy for over three hundred years.

The French were made happy in 1436 by seeing Paris freed from English occupation, and new life breathed into the nation. About four years thereafter the art of printing was invented by John Gutenberg, and thereby a new realm opened for thought and ambition, and a new stimulus given to civilization.

The Cape Verd Islands were discovered in 1446; the years that immediately followed were noted by other valuable discoveries by the world's busy navigators. The year 1453 was marked by the signal event of the fall of the Eastern Empire of the Romans; Constantinople was taken by the Turks in the same year; three years prior the invention of engraving on copper had appeared. In 1455 began the Wars of the Roses, which during thirty years saturated England's soil with the best blood of her sons. A grand year for Spain was that of 1469, when the marriage of Ferdinand and Isabella united the crowns of Aragon and Castile, and gave Spanish arms a magnificent prestige among the nations. This was the age of the cultured and luxurious Moors, typified in the unapproachable Alhambra. The English throne was blighted for two years by the reign of Richard III, by whose death on Bosworth field in 1485 the glorious reign of the Tudors was ushered in.

The siege of Granada ended disastrously for the Moors in 1492, practically closing their rule in Spain; and the same year the overshadowing event of modern civilization, the discovery of America, took its place in history; the West Indies were explored, and Europe was fired with a fever of colonization; Columbus soon after touched the mainland of the American continent.

It was only five years later (in 1497) when Vasco da Gama, doubling the Cape of Good Hope, sailed to the East Indies; and the same year Sebastian Cabot landed in North America. The first book of Algebra was printed in Europe in 1494, two years after the discovery of America; and Savonarola's martyrdom lighted up, in 1498, the closing years of a century prolific in great events.

PERIOD VIII.

A. D. 1500 TO A. D. 1600 — THE AGE OF DISCOVERY AND ADVANCEMENT.

The Portuguese followed close on the heels of the Spanish in the realm of discovery, and opened the sixteenth century with achievements only secondary in importance to those of Columbus. They still believed that there was a larger West than he had brought to light; nor were English navigators or those of other lands idle. The Portuguese discovered Brazil in 1500, while Gosnold, of England, and others made great progress in exploring the coasts of North America; and six years later the Portuguese discovered the island of Madagascar.

It was in 1511 that Spain completed the reduction of the luckless "Gem of the Antilles," by a policy of cruelty which recalls that pursued by her to-day; the following year the French, by the battle of Ravenna, lost their hold on Italy; and the next year the French were defeated at the "Battle of the Spurs," and also at Terouenne; later in the same bloody year ten thousand bonnie Scots laid down their lives on Flodden Field.

In 1517 Luther published his theses, expressing his view on certain tenets and practices of his time, thus beginning the Protestant Reformation. In 1520 Magellan explored the Southern seas and discovered the straits which bear his name; the succeeding year Cortez completed the conquest of Mexico; and the next year thereafter one of the ships of the tireless navigator Magellan sailed round the world. In 1521 the Emperor Charles held his first diet at Worms and Luther was summoned thither to answer for his heresy.

Gustavus Vasa, about whom every intelligent youth loves to read, became in 1523 king of the triumphant monarchy of Sweden; and Pizarro and Almagro began about the same

period the conquest of Peru, which ended in eight years with the complete subjection of the opulent land of the Incas, and consummated a long series of achievements on land and sea, peaceful and warlike, that brought the glory of Spain to its apex.

A notable period for England was the year 1534, the Reformation reaching England and embracing among its incidents Henry VIII's quarrel with Luther and his breaking with the Pope, which resulted in the establishment of the Church of England; Ignatius Loyola founded the Jesuit order in 1540, and about the same time the monasteries were generally dissolved in England; Mary Queen of Scots assumed the Scottish throne in 1542.

The long and notable eighteen-year session of the Council of Trent was begun in 1545, settling many profound questions for the faithful; in 1547 Henry VIII's son, Edward, was crowned; in 1553, his daughter Mary. In the second year of Mary's reign, Lady Jane Grey was beheaded; and in 1558 Queen Elizabeth came to the throne, and began a reign which raised England to the position of leader among the Old World's powers.

The same year the French took Calais, and two years later broke out in France the civil war between the Condès and Guises; in 1560 stern old John Knox completed the Reformation in Scotland.

In 1569 the Huguenots were defeated at Jarnac and their leader, Louis, Prince of Conde, was slain; in 1571 occurred the battle of Lepanto; in 1572, the massacre of St. Bartholomew, and from 1573 to 1574 the memorable siege of Leyden.

The year 1580 was notable for the fact that England's great naval commander, Sir Francis Drake, circumnavigated the globe; two years later Gregory XIII introduced the "new style" of chronology, adding ten days to the calendar on the fifth day of October: and in

1584 one of the most dastardly deeds in history was done in the murder at Delft of William the Silent, Prince of Orange.

Virginia was discovered in 1584 by Sir Walter Raleigh; three years after this event the luckless Queen of Scots was beheaded, and thereby the remainder of Queen Elizabeth's life clouded. A year later Spain received the death-blow to her hopes of conquest by the destruction to her "invincible Armada;" in 1590 the University of Dublin began its powerful influence, held ever since, in the world of letters; Henry IV won glory the same year in the battle of Ivry.

The great bank of England was incorporated in 1594; four years later, "Henry of Navarre" issued the ever-memorable Edict of Nantes, the charter of toleration; the century closed by Tyrone's rebellion in Ireland.

PERIOD IX.

A. D. 1600 TO A. D. 1700—THE ERA OF COLONIZATION.

The colonization spirit in Europe, which had begun to manifest itself in connection with the sixteenth-century era of discovery, flourished with vigor in the seventeenth century. In the last year of the preceding century that greatest of all incorporations, the East India Company, was organized.

Queen Elizabeth opened the new century by giving her reluctant consent to the execution of the Earl of Essex; in 1602 decimal reckoning was invented at Bruges; the year following, the proud Elizabeth ended her earthly glory upon a death-bed of remorse, and poetic justice placed upon the throne as her successor James I, the son of the Queen of Scots. In the second year of James's reign, the gunpowder plot of Guy Fawkes gave England the greatest scare in all her annals.

The London Company sent a colony to Jamestown, Va., in 1607.

In 1609 Hendrik Hudson explored the noble river which bears his name; Galileo the next year discovered the Satellites of Jupiter; the brave Henry IV was assassinated by the fanatic Ravallac; "the last sigh of the Moor" was heard in Spain; and logarithms were invented by Napier of Marchistoun.

The matchless William Shakspeare died in 1616 in his native Stratford-on-Avon; and in the years from 1619 to 1628 William Harvey established the theory of the circulation of the blood, which it is claimed had been discovered in the previous century by the religious martyr Servetus.

The Pilgrims, landing at Plymouth, made the year 1620 an initial one in American history, and opened a new era in civilization; Manhattan Island was settled three years subsequently by the sturdy and stolid Dutch, who later on built up the great Empire State.

Two years later Charles I came to the English throne under glad auspices, contrasting strongly with his tragic end; the same year marked the English settlement of the Barbadoes; in 1632 the Christian hero of the North, Gustavus Adolphus, fell at the battle of Lutzen.

Maryland was colonized by Lord Baltimore under liberal and tolerant laws in 1634, and within two years thereafter the martyr-like Roger Williams with his devoted followers settled Rhode Island; the next year the great Richelieu established the French Academy; in 1638 was signed the Scottish "Solemn League and Covenant;" two years afterward the English colonized Madras; and one year later occurred the Irish rebellion and the execution of the Earl of Stafford.

The year 1642 was another initial one in English history, as the battle of Edgehill, which was fought that year, precipitated the

great civil war, with its terrible and long-enduring consequences. Within three years the head of Archbishop Laud was brought to the block, and simultaneously the Royalists felt the power of Cromwell at Naseby. In 1648 the civil war of the Fronde broke out at Paris.

The year 1649 was darkened by a royal tragedy, for in that year the head of Charles I fell on the scaffold, and the English Commonwealth took its place among the organized powers of the world; and the year after Cromwell gained a great victory with his Ironsides at Dunbar over the Scotch Covenanters.

Hostilities began between the English and Dutch, under the firm hand of Cromwell, two years later. Inspired by his success, Cromwell then laid the foundations of the English navy.

Within a twelvemonth from this time the Commonwealth came to an end, and Cromwell was made Lord Protector. Admiral Palm in 1655 captured Jamaica.

After having ruled as Protector with a firm hand for five years, Oliver Cromwell died in 1658, and his weak son Richard succeeded him. Within two years England, tired of unstable government, restored the Stuart Monarchy in the person of Charles II. The Carolinas were colonized in 1663, and the English took New York the following year.

England's two great afflictions, the plague and the fire of London, occurred, the one in 1664 to 1666, and the other in 1666. By the peace of Breda in 1667, England obtained possession of the territory embracing the states of Pennsylvania, New York, and New Jersey; the habeas corpus act, second only to the Magna Charta in importance as a constitutional movement, was passed in England two years subsequently; and Monmouth defeated the Covenanters at Bothwell Bridge in the same year.

Peter the Great became partial sovereign of Russia in 1682, and sole monarch in 1689; the wise and good William Penn settled Pennsylvania in 1682; three years after this the vacillating James II came to the English throne; and the same year witnessed the revocation of the Edict of Nantes, whose long train of cruel consequences darkened France for many a day; the same year occurred the rebellion under Monmouth, the battle of Sedgmoor, and Monmouth's humiliating death on the scaffold.

Then marched grandly forward the crowning event of the period, the English revolution in 1688, the landing of William of Orange from Holland, the battle of the Boyne, the ignominious flight of the deposed James II, and the crowning of William and Mary.

The year 1692 was memorable for two events of military glory, and one of civil infamy: the great naval battle off La Hague, the infamous massacre of Glencoe, and the battle of Steenkirk (or Enghien).

The peace of Ryswick, concluded in 1697, marked a new era in diplomacy; and two years from that time witnessed the abortive attempt to found a Scotch colony on the Isthmus of Darien.

PERIOD X.

A. D. 1700 TO A. D. 1750 — CIVIL LIBERTY AND INTELLECTUAL PROGRESS.

Yale College was founded in 1701; James II died in ignoble exile in France the same year; within a twelvemonth his daughter Anne succeeded William III on the English throne; the same year began the French colonization of the Mississippi Valley, and the English wrested from Spain the stronghold of Gibraltar; the great Marlborough, the ruling spirit of the day, won the victories of Blenheim (1704), Ramillies (1706), Malplaquet (1709), and others; Queen Anne died in 1714, occasioning the installation of the Hanoverian dynasty.

The year 1715 was distinguished by the Jacobite rebellion in Scotland and the battle of Sheriffmuir, immortalized by Burns; and in that notable year of financial excitement, 1720, burst the "South Sea Bubble," and John Law's Mississippi scheme, whereby rich and poor alike were fleeced of their money. Within the period of a dozen years or more, the world was enriched by the birth of such geniuses as Linnaeus the naturalist (b. 1707), Fielding the novelist (b. 1707), Samuel Johnson the lexicographer (b. 1709), Hume the historian (b. 1711), Rousseau the social philosopher (b. 1712), Sterne the novelist (b. 1713), Garrick the actor (b. 1716), Gray the poet (b. 1716), and Smollett the historian (b. 1721).

Fahrenheit invented the thermometer in 1726; one year previous Peter the Great had died and left as a vast civilized empire what he found as a crippled, embarrassed, barbarous kingdom; Clive, the great conqueror of India, first breathed British air the same year; George II was crowned king of England in 1727; North and South Carolina were separated; the year 1729 gave to the world the names of Burke, the statesman, and Suwaroff, the great field-marshal. Wedgwood the artist was born in 1730, and the poet Cowper the year following.

1732 was our own red-letter year of the birth of the peerless Washington, also that of the great composer Haydn, and of the hero of England's greatest trial, Warren Hastings. The following year Gen. Oglethorpe colonized Georgia; the same year Mesmer was born, who gave the science of mesmerism to the world. In 1736 Hull succeeded in inventing a steam-engine, and James Watt was born.

Gibbon the gifted historian first saw the light in 1737, and the same year Galvani, the electrician, was born; also, Herschel the wonderfully endowed astronomer, and West the great portrait painter, were born the following

year; about the same period Siber-Kuhn invented the solar microscope; the "unspeakable Turk" besieged Belgrade in 1739, the beneficent London foundling hospital was established, and the master of pulpit eloquence, Whitefield, began preaching in the streets and fields.

That over-mastering genius, Frederick the Great, came to the Prussian throne in 1740; New Hampshire and Massachusetts were divided the next year; the physiognomist Lavater was born and the great historian Rollin died in 1741; in 1743 was fought the battle of Dettingen in Bavaria, and the same year America gave birth to that grand statesman, Thomas Jefferson.

What was known as "King George's War" occurred in the year 1744; the same year "the Young Pretender" made an attempt at revolution in England; the battles of Falkirk and Culloden were fought, where many a Scot bit the dust; and the Duke of Cumberland's cruelties drove thousands of Scotchmen to America and other countries.

The year 1747 saw Balmerino, Kelmarnock and Lord Lovat go bravely to the block; the previous year marked the birth of the nobly endowed Swiss educator, Pestalozzi, and the naval engagement off Cape Finisterre destroyed one of France's finest fleets the same year. Jeremy Bentham, the political philosopher, was born in 1748; and in 1749 there also came into the world Mirabeau the French revolutionist, Alfieri the Italian poet, Laplace the astronomer, Goethe the poet and philosopher, Charles James Fox the statesman, Tip-poo-Sahib the barbarous Indian sultan; and Edward Jenner the illustrious anatomist.

PERIOD XI.

A. D. 1750 TO A. D. 1800—THE EVOLUTION OF THE REPUBLIC.

Already events were culminating toward the formation of a new nation out of the ele-

ments of liberty which had been gathering strength for over a century in the new world. The Puritans of New England, the Dutch of New York, the cavaliers of Virginia, the Catholics of Maryland, the Huguenots of the Carolinas, were all verging toward one focal point, the achievement of independence and the stirring events of the old world but added inspiration to the rising spirit of the new.

Clive was conquering for England a mighty empire in the East; the great British Museum was founded in 1753; Franklin discovered electricity; the French and Indian war was in progress; Braddock suffered his signal defeat; and Washington had risen from a country surveyor to a colonelcy in the British army.

The tragedy of the Black Hole of Calcutta appalled the world in the year 1756; the Seven Years' war between Prussia and the Austro-French alliance was begun; and that melodious soul, Mozart, was born; in the following year the signal victory at Plassy was won by Clive; and Washington's and America's loyal and chivalrous friend, Lafayette, was born; Robespierre, the revolutionist, and Horatio Nelson came into the world the next year.

Humanity lost a bright exemplar when, in 1759, the hero Wolfe fell on the plains of Abraham, and England conquered Canada; and the same year gave to the world Pitt the statesman, Wilberforce the philanthropist, Danton, a figure in the French revolution, and Burns and Schiller the poets. The long reign of sixty years of George III began in 1760, and the Eddystone Lighthouse was built.

The mutterings of the coming storm of revolution now began to be heard in the old thirteen colonies, the obnoxious "writs of assistance" being issued in Massachusetts in 1761. The year 1763 was marked by the conclusion of the Peace of Paris; Black's discovery of

latent heat was made known; and Jean Paul Richter, the Damascus blade of German literature, was born.

The British Parliament passed the odious Stamp Act in 1765; the Colonial Congress convened in New York City, and the heroic spirits of the day successfully resisted the Stamp Act and the following year it was repealed; Pitt's second administration took its place in the swift current of events; and this year Malthus, the author of the "Malthusian theory" of over-population, and Madame de Staël, the fascinating authoress of *Corinne*, were born.

Watt patented the steam-engine in the year 1769, and the following galaxy of geniuses came upon the world's stage of action: Napoleon Bonaparte, the Duke of Wellington, Alexander Humboldt, Marshal Ney, Cuvier the naturalist, Castlereagh the statesman, the elder Brund the engineer, Sir Thomas Lawrence the artist, and Mehemet Ali. The "Boston Massacre," which occurred in 1770, thrilled all the land with indignation, and provoked the demand for the withdrawal of the British troops.

In 1771 were born that prince of all wits, Sidney Smith, Lingard, Sir Walter Scott, and Prince Murat; the *Encyclopedia Britannica* appeared; the indomitable Warren Hastings became governor of Bengal; the royal marriage act was passed in England, and that singularly clear intellect, Samuel Taylor Coleridge, was born.

In 1772 occurred the first partition of Poland; in 1773 the intrepid Captain Cook made his second and principal voyage of discovery; and in the same year the never-to-be-forgotten "Boston Tea Party" threw overboard, with the rich cargoes of tea, all hopes of reconciliation between the patriots and the parent government.

The next year the Continental Congress

assembled in Philadelphia; the arbitrary "Boston Port bill" was passed; and Gage usurped the governorship of Massachusetts. Oxygen was discovered by Priestley and Schule; and Southey and Mezzofanti was born.

The conflict with the oppressing power at last came in the colonies. The battle of Lexington was fought, where the shot was fired that "echoed round the world;" the struggles at Concord and Bunker Hill followed; George Washington was chosen by the devoted patriots to command their hastily gathered forces. In the year 1775 were born Charles Lamb (the gentle "Elia"), J. M. W. Turner (the painter whom Ruskin has immortalized), Jane Austen the romancist, and Daniel O'Connell.

The Declaration of Independence was issued in 1776 by the Congress in Independence Hall, Philadelphia, whose historic bell tolled forth the fact to all peoples; the British evacuated Boston, but still occupied New York; the battles of Long Island and Trenton were fought; the brave Nathan Hale was hanged as a spy, expressing with his dying breath the regret that he had but one life to offer up for his country.

The battles of Brandywine, Philadelphia, Germantown, and Saratoga were fought in 1777 and won by the American revolutionists, the last-named being mentioned by Creasy as one of the fifteen decisive battles of the world.

The next year France recognized the independence of the new American nation, Voltaire and the elder Pitt closed their illustrious careers in death, the battle of Savannah was fought, Sir Humphrey Davy was born, and the brave Captain Cook was mercilessly slaughtered by savages the year following.

Two years later, Charleston, S. C., surrendered to the patriots, the hotly contested battle of King's Mountain occurred, the base treason of Arnold was discovered, Washington had to perform the painful duty of ordering the

execution of the gallant Major Andre as a British spy, the French fleet appeared off Newport, and the beneficent discovery of vaccination was made by Jenner.

The surrender of Cornwallis at Yorktown in 1781, virtually closed the long struggle of the Revolution; in this year Herschel discovered the great Uranus, Robert Raikes originated the blessing of Sunday-schools, and George Stephenson, the English engineer, and Chantrey, the sculptor, were born.

The preliminaries of peace between America and England were settled the year following, and all the land was made glad by the final evacuation of the British troops at New York;

Washington patriotically and cheerfully rendered up his commission to his government; Bolivar, the great liberator of South America, was born; and Mongolfier made his noted experiments in ballooning.

Washington retired to Mt. Vernon in 1784; Samuel Johnson, the lexicographer, died; the Bramah lock was patented; and the next year Ambassador John Adams was presented at the English court.

In the notable year 1786, the eloquent Edmund Burke, on behalf of the people of England, "in the great hall of William Rufus," impeached Warren Hastings of "high crimes and misdemeanors," of which, eight years later, he was declared innocent; Massachusetts adopted a decimal currency; Cornwallis, who had been so soundly whipped by Washington, was appointed Governor-General of India; Shay's Rebellion, in Massachusetts, broke out and was signally suppressed; and Great Britain lost one of her best naval commanders, Admiral Keppel.

The Constitution of the United States was framed, in 1787, by a National Convention comprising the leading patriots of the war; and the same year a great step in the aid of humanity was taken by the organization of

the society for the suppression of the slave trade.

The *London Times* was established the following year by Walter, whose family own it to-day; Charles Stuart, the young pretender, died; the never strong-brained George III was declared insane; eight states ratified the Constitution of the United States; and General Washington was elected the first president of the new republic.

In the year succeeding the culmination of our efforts to create a nation, the French Revolution burst in fury upon the world; the Bastille, noted for wrong and cruelty, fell at the hands of a Paris mob; and Herschel completed the construction of his wonderful telescope. The year 1791 was marked by the deaths of John Wesley the Evangelist, Mirabeau the Revolutionist, and Potemkin the soldier; Galvani published his discovery of electricity; and Louis XVI made his notable flight to Varennes.

In the year that followed, the French Revolution was in full blast; and the same year the first use was made of illuminating gas.

The darkest blot in all the eras of civilization, the French reign of terror, occurred in the next year; Washington, elected the previous year, was reinaugurated president of the United States; and young Napoleon first distinguished himself at the siege of Toulon.

The serious whisky rebellion occurred in Pennsylvania in 1794; Kosciusko's influence was supreme in Poland; the execution of the wretch Robespierre ended the reign of terror, "Mad" Anthony Wayne defeated the American Indians; and Claude Chappe invented the French telegraph.

Warren Hastings was acquitted in the year 1795, after England had tired of the trial; Jay's treaty with England was negotiated; and the French Institute and the Polytechnic school were founded.

Napoleon Bonaparte had by 1796 become a power in Europe, strangely contrasting in character with Washington, who that year retired from public life, asking no crown nor guerdon. Napoleon fought the famous battles of Lodi and Arcola, and these and other triumphs thrilled the French heart. In the same year John Adams was elected president of the United States.

One of the brightest names of literature, Robert Burns, was sealed in death in 1796, and that of Edmund Burke the year following. The leading warlike event was the battle of Camperdown in Holland, where the British gained a notable victory over the Dutch.

In the succeeding year Napoleon initiated his Italian campaign, capturing Rome and taking Malta, and afterward occupying Egypt, where he fought the noted battle of the Pyramids; Nelson gained his great victory at the battle of the Nile; Senefelder invented lithography; and the musical world was delighted by the production of Haydn's immortal oratorio of the "Creation."

Napoleon's forces the next year entered Naples; later on they captured the fortress of Ehrenbreitstein; after which they overran Syria and besieged Acre. In this year the first coalition of European powers against Napoleon was formed; Napoleon was chosen first consul of France; and Washington closed his noble career by a peaceful death at Mt. Vernon.

PERIOD XII.

A. D. 1800 TO 1850—THE DEVELOPMENT OF THE NEW NATION.

Thomas Jefferson was elected president in 1800; Napoleon crossed the Alps, and fought the battle of Marengo; the English captured Malta and Mysore; the Austrians were beaten by the French and Bavarians at the battle of Hohenlinden; and science was enriched by the invention of the Voltaic pile.

Admiral Nelson signalized the opening century by his great victory at Copenhagen; the French evacuated Egypt; and the first census of Great Britain was taken.

Ohio joined the American Union in 1802; and the next year the United States effected the purchase of Louisiana, constituting the chief glory of Jefferson's administration; an American naval expedition was fitted out against Tripoli, and a rebellion broke out in Ireland.

Alexander Hamilton fell in a duel with Aaron Burr in 1804; Thomas Jefferson was re-elected president; the "Code Napoleon" was promulgated by the victorious French emperor, then in the height of his glory; the Duc d'Enghien was entrapped on foreign soil and summarily executed by Napoleon's orders; the British and Foreign Bible Society began its great work, and Savings Banks became permanent organizations.

Two great victories were gained in 1805 by two great men: Horatio Nelson coupled a glorious victory with a glorious death at the battle of Trafalgar; and Napoleon won perhaps his most signal triumph on the field of Austerlitz. The next year was brought to light the conspiracy of America's Catiline, Aaron Burr; and in the old world the increasing conquests of Napoleon excluded all other events from the public mind.

The year 1807 was notable for several events of vast importance, among which were the battle of Eylau, the first forcing of the Straits of Dardanelles; the Milan decree; and the first trip of Fulton's steamboat on the Hudson River.

The election of James Madison as president occurred the next year; also the siege of Saragossa; the French suffered reverses at Baylen, Vimiera, and Corunna, and the same year were fought the battles of Wagram and Telavera; the year after were founded the Uni-

versity of Berlin and the sect of Primitive Methodists.

Napoleon's Mamelukes were massacred in 1811 by the Turks; the popular cry of "Free Trade and Sailors' Rights" heralded the second war between America and England; the battle of Tippecanoe in Indiana was fought, and the Indian chief Tecumseh killed, and the great comet made its appearance.

1812 was a year of some important events and some great calamities. Louisiana entered the Union; the terrible massacre of the garrison of Fort Dearborn, Chicago, occurred; James Madison was re-elected president; Napoleon declared war against Russia, and, marching confidently forth to effect her overthrow, met with the colossal disaster of the burning of Moscow, followed by the horrors of the retreat of his grand army.

The next year occurred the celebrated naval battle between the Shannon and the Chesapeake; Wellington gained victory after victory over the French in the Peninsular war; and Davy discovered the electric light.

The war with Great Britain was still on in 1814; Canada was invaded by American troops, and the British, sailing up the Potomac, seized and burned the city of Washington; the Hartford convention, pervaded by an odor of treason, met and uttered murmurs against the war; England fitted out an expedition against New Orleans; and Napoleon suffered the humiliation of abdication and banishment to Elba.

General Jackson fought the battle of New Orleans in the year 1815, and overwhelmingly defeated the confident British invaders; Napoleon, effecting his escape from Elba, began the "war of the hundred days," leading up to the grand historic event of Waterloo, from which the great Captain who had terrorized Europe fled in the shadows of the night, to be eventually captured and exiled on the storm-

beaten rock of St. Helena; the brave Marshal Ney was most unjustly executed; and Humphrey Davy invented the safety lamp.

The next year Indiana came into the Union; James Monroe, author of the Monroe doctrine, was elected president; and Ronalds invented the electric telegraph. The year following Mississippi was admitted into the Union; Curran, the eloquent Irish orator, and Kosciusko, the Polish patriot, died; and Brewster invented the kaleidoscope.

Illinois was admitted into the Union in the year 1818; and Laennec invented the stethoscope; in 1819 Florida was ceded to the United States by Spain; Alabama came into the Union; Macadam's system of road-making was introduced, and Oersted discovered magnetism.

The year following Maine was admitted into the Union; Monroe was re-elected president, and George IV began a ten years' weak reign.

A year afterward Missouri came into the Union as the result of the historic Missouri compromise; Brazil achieved her independence; and death claimed the rich-souled poet, John Keats, and the fallen hero, Napoleon Bonaparte.

Once again in 1822 the Greeks declared against Turkish rule, and, asserting their independence, took possession of Athens; the Caledonian canal was completed; and Babbage invented his calculating machine.

The following year Joseph Smith pretended to have found the golden book of Mormon, and founded the sect of Mormonism. In 1824 Lafayette re-visited the United States; the pretender, Iturbide, was shot in Mexico, and Lord Byron closed his restless life at Missolonghi in Greece.

John Quincy Adams, having failed in obtaining a majority in the electoral college, was, in 1825, chosen president of the United

States by the **House of Representatives**; the lime light was invented by Drummond; and the first voyage from England to India by steamboat was made.

In 1826 Thomas Jefferson and John Adams, former presidents of the United States, both died on the fourth of July. Flaxman, the illustrious sculptor, also died this year.

The year 1827 was marked by the battle of Navarino; Dreyse invented the terrible needle gun; the omnibus was first introduced into Paris; and death removed Pestalozzi the educator, Canning the statesman, and Foscolo the poet.

That embodiment of firmness, Andrew Jackson, famous for his utterance "The Union! By the Eternal it shall be preserved!" was the next year elected president of the United States.

In 1830 William IV succeeded the last of the Georges on the English throne; Belgium achieved her independence of Holland; and the patriot Bolivar died.

Andrew Jackson was re-elected president two years later; the leading event in the industrial world was the invention by Heathcote of the steam plow; and death closed the records of those three great geniuses, Goethe, Cuvier, and Walter Scott.

Slavery was finally abolished in the British West India possessions in 1833; Santa Anna was elected president of Mexico; and Edmund Keene, Hannah Moore, and the philanthropist Wilberforce died.

Lafayette died in 1834; in 1835 Texas asserted her independence of Mexico, Colt's revolver was invented, and war broke out with the Seminole Indians.

Martin Van Buren was elected president in 1836; in 1837 Victoria, daughter of the Duke of Kent, came to the throne of England; the philanthropist Father Mathew began his grandly successful temperance crusade; and

cholera prevailed to an alarming extent in Europe.

The year after, Papineau's Rebellion was suppressed in Canada, and Daguerre, by his wonderful invention, paved the way for the grand developments of photography. The next year was an eventful one in the far Pacific. New Zealand was settled, and gold discovered in Australia; both of which countries have since astonished the world by their progress.

General Harrison was elected president of the United States in 1840; Queen Victoria was married to "Albert the Good;" the Penny Post was established; and Schonbein discovered ozone.

The Dorr Rebellion broke out in Rhode Island in the succeeding year; the Mormon temple at Nauvoo was founded, and the *London Punch* made its appearance.

In 1842 was signed the Webster-Ashburton treaty between the United States and Great Britain; and the steam hammer was patented by Nasmith. The next year Natal was annexed to Cape Colony, in South Africa; Botta discovered the site of Nineveh; and the poet Southey died.

James K. Polk was elected president of the United States in the year 1844; the first telegraph line was erected in the United States; Joseph Smith, the Mormon prophet, was killed by a mob, and was succeeded by Brigham Young; and the Mormon war in Illinois occurred.

Florida and Texas were admitted into the Union the next year, during which hostilities began on the Texas border, which led to the Mexican war; gun cotton was invented; and England suffered a railway panic.

The Mexican war was in full blast through the year 1846, and the American volunteers gained victories at Palo Alto, Resaca de la Palma, and Monterey; the Sikh war broke out,

famine prevailed in Ireland; and the planet Neptune was discovered.

The next year the Americans were again victorious over the Mexicans, winning the battles of Buena Vista, Vera Cruz, Jalapa, and Chapultepec; the Mormons founded Salt Lake City; Barnum brought Jennie Lind to America; Sir John Franklin and the composer Mendelssohn died.

In 1848 General Zachary Taylor was elected president; gold was discovered in California, followed by a tremendous exodus of the citizens of the States across the continent; and Louis Napoleon was elected president of the French republic.

In 1849 Livingston discovered Lake N'gami; and Edgar A. Poe and Mehemet Ali died.

PERIOD XIII.

A. D. 1850 TO DATE—THE PROGRESS OF THE NATION.

California, the fruit of the Mexican war, joined the Union in 1850; the Fugitive Slave law was passed this year and became one of the irritating elements in the agitation which brought on the rebellion; McClure discovered the Northwest Passage; a submarine telegraph was laid between France and England; the statesman Peel, the poet Wordsworth, and the novelist Balzac died.

In 1851 death robbed American literature of Cooper, the delightful novelist, and American science of Audubon, the gifted ornithologist; Louis Napoleon, by his noted *coup d'état* overthrew the republic and became emperor of France.

The subsequent year Franklin Pierce was elected president of the United States; a revolution occurred in Mexico; and death claimed those four great names, Henry Clay, Daniel Webster, the Duke of Wellington, and the poet Thomas Moore.

Kansas and Nebraska were torn by civil dissensions during the succeeding two or three years over the effort to establish slavery within their borders; Commodore Perry made his first expedition to Japan, which was productive of such beneficial results, commercial and diplomatic, to our country; Armstrong invented his rifled cannon; and the Crimean war was in fierce progress.

The first Niagara suspension bridge was completed in the year 1855; and Bessemer gave to the world the benefit of the invention of his steel process.

The next year James Buchanan was elected president of the United States; the allies evacuated the Crimea; the gifted geologist, Hugh Miller, went out of life into a suicide's darkened death; and Heinrich Heine the poet, and Schumann the composer, died.

The Dred Scott decision created, a year later, a revolution in political thought; the Mormon Rebellion broke out; the first attempt was made to lay the Atlantic cable; the East Indian mutiny occurred, with all the horrors of Cawnpore; and the Mont Cenis tunnel was begun.

Minnesota was admitted into the Union in 1858; the Atlantic cable was successfully laid, under the inspiration of Cyrus W. Field; the charter of the East India Company was transferred to the English Crown; Donati's comet was discovered; and the intrepid Captain Speake discovered Lake Victoria Nyanza.

John Brown's raid at Harper's Ferry, which greatly helped to bring on the Civil War, and his death on the scaffold at Charlestown, making him the colored man's saint, were the salient events in America in 1859; Oregon was admitted into the Union.

During this year death claimed many geniuses in various ranks of intellectual effort, among them Hallam, Prescott, Macaulay, and Irving, the historians, Alexander von Hum-

boldt the philosopher and explorer, Prince Metternich the statesman, Leigh Hunt, the poet, and De Quincy the English opium eater; and the gigantic Victoria bridge was opened at Montreal.

Abraham Lincoln was elected president of the United States in 1860, and his success became the signal for the inception of the great Rebellion; South Carolina took the advance in seceding from the Union; the marvelous phenomena of the spectrum analysis were given to the world; the discovery of oil wells in Pennsylvania added one more to America's great industries; Garibaldi won for Victor Emanuel the Neapolitan provinces of Italy; and the eloquent preacher Theodore Parker, the philosopher Schopenhauer, and the great navigator, Cochran, died.

The next year came the concerted movement of secession; the firing on the stars and stripes at Fort Sumter, and Anderson's brave defense. Jefferson Davis was elected president of the Southern Confederacy; the Confederate Congress met first in Montgomery and afterward in Richmond; the United States suspended specie payment; and the first work of the signal service began.

In 1862 Ericsson's pride, the Monitor, triumphed over the Merrimac; the federal forces captured New Orleans; the battles of Bull Run, South Mountain, Antietam, and Fredericksburg were fought; the Alabama was fitted out as a privateer by the Confederates; the French fought to sustain Maximilian on the Mexican throne; Ex-president Martin Van Buren died; and the Lancashire cotton famine occurred.

President Lincoln made the year 1863 historically memorable by issuing his immortal Emancipation Proclamation; Pemberton surrendered to Grant at Vicksburg; the battle of Gettysburg was fought; Fort Hudson and Chattanooga were occupied by the federal troops;

"Stonewall" Jackson was killed at Chancellorsville; West Virginia became a separate state; a great Fenian convention met at Chicago; and the ill-starred Maximilian became the short-lived emperor of Mexico.

The war of the Rebellion continued through 1864, during which Sherman made his historic march from Atlanta to the sea; the federal Kearsarge sank the confederate Alabama; Garibaldi made his noted visit to England, which he was, with diplomatic politeness, invited to cut short; the beneficent Red Cross association was organized for the relief of the wounded in war; Nobel effected his invention of dynamite; and death took away the composer Meyerbeer, the novelist Hawthorne, and the poet Landor.

President Lincoln in 1865 entered upon the second term of office to which he had been triumphantly elected the year previous; Grant took Richmond; and General Lee, after a desperate struggle of four years, surrendered at Appomattox, and the overthrow of the confederacy was assured; Johnson surrendered his confederate army to General Sherman.

The spring of the same year John Wilkes Booth perpetrated the worst crime of the age in the assassination of President Lincoln; Jefferson Davis was taken prisoner, and the great Rebellion closed. The Fenian agitation broke out anew in England; and the death list was augmented by the names of Proudhon, Richard Cobden, Professor Aytoun and Lord Palmerston.

The Fenian raid into Canada was made in 1866; the brief but decisive campaign of the Austro-Prussian war was fought; and Whewell the philosopher and Keble the divine died.

In 1867 the purchase of Alaska from Russia by the United States was effected; Mexico was evacuated by the French; and, with "Poor Carlotta" upon his lips, Mexico's foreign emperor, Maximilian, fell perforated with republican bullets; that great engineering feat, the Suez

Canal, was completed; England fitted out an expedition against King Theodore of Abyssinia, and equipped another expedition to search for Dr. Livingston; and Faraday and Victor Cousin died.

The year following President Johnson was tried on impeachment and acquitted; U. S. Grant was elected president of the United States; the Carlists revolted in Spain; Ex-president James Buchanan, Brewster the Scotch physicist, and Narvaez the Spanish statesman, died.

The completion of the Pacific railway marked the year 1869; the Irish church was disestablished; and Lamartine, Saint-Beuve the great critic, and the Earl of Derby died.

Gen. R. E. Lee, Lopez of Paraguay, Charles Dickens, and Marshal Prim died the next year; a Vatican decree promulgated the doctrine of the infallibility of the Pope; the Franco-Prussian war was begun; the Germans won at Sedan, Metz, and Tours, and gained other noted victories, and invested the city of Paris, which endured the horrors of the Commune and the barbarous slaughters of the hostages.

In 1871 the city of Chicago was partially destroyed by fire; the Alabama commission met; the victorious Germans entered Paris, and at Versailles crowned King William emperor of Germany; the Mont Cenis tunnel was opened; and the noted Tichborne case was brought to a close.

President Grant was re-elected the next year; Boston was visited by a great fire; England obtained from the Dutch the malarial gold coast; an extensive eruption of Mt. Vesuvius occurred; and the Ballot Act effected material election reforms in England. The treacherous murder of Gen. Canby by the Modoc Indians occurred in 1873; Mac Mahon became president of the French Republic; and the Shah of Persia visited England.

The next year England paid the Alabama award to the United States; Bazaine was tried and condemned for surrendering Metz; and the Germans finally evacuated French territory.

The year succeeding, Colorado came into the Union; the ships Alert and Discovery entered upon the Arctic exploration; and the Prince of Wales visited India.

Rutherford B. Hayes was elected president of the United States in 1876; the Centennial Exposition was held at Philadelphia; and the terrible massacre of Gen. Custer with the 7th Cavalry took place.

The great railroad strike occurred the subsequent year; Turkey held its first Parliament; Diaz was elected president of Mexico; the Nihilist agitation increased in Russia; and Ex-president Thiers of France died.

Gold stood at par on Wall street in New York in 1878; the Paris International Exposition was opened; and in this year occurred the death of Pope Pius IX and of Victor Emanuel I, King of Italy.

The United States resumed specie payment the next year; the Jeannette Arctic relief expedition sailed; the gallant young prince, Napoleon, son of Napoleon III, fell in the war between the English troops and the Zulus; and a passing train crushed the great Tay Bridge in Scotland, causing scores of deaths.

James A. Garfield was elected President of the United States in 1880; the St. Gothard tunnel was opened; the Cologne cathedral was completed; and the railroad up Mt. Vesuvius was constructed.

The year 1881 was darkly shadowed by the assassination of President Garfield and Czar Alexander of Russia; the United States celebrated the centennial of Yorktown; and the English Government suppressed the Irish Land League.

The Irish cause was damaged by the terrible

Phoenix Park murders which occurred in 1882; and, as a result of the war between England and Egypt, Arabi Pasha was defeated and banished.

In 1883 the United States celebrated the centenary of the British evacuation of New York; the great Brooklyn Bridge was opened; and two more Atlantic cables were projected.

The Washington Monument was completed in 1884; Grover Cleveland was elected president of the United States; Gen. Greeley and his fellow survivors of the Arctic expedition were rescued in a perishing condition; the war in Soudan was prosecuted; and financial panics prevailed in the United States.

Gen. Grant met the following year a lingering death bravely and cheerfully; the grim Conqueror also claimed Victor Hugo, Vice-President Hendricks, Gen. Geo. B. McClellan, and King Alfonso of Spain.

The Volunteer won the international yacht race in 1886, the Irish agitation acquired increased intensity, and Samuel J. Tilden and Gen. Winfield S. Hancock died.

In 1887 the jubilee of Queen Victoria's reign was celebrated throughout the British Empire. Henry Ward Beecher and Jennie Lind, died.

Benjamin Harrison was elected president of the United States in 1888; England celebrated the tercentenary of the repulse of the Spanish Armada, and Russia the 900th anniversary of the introduction of Christianity into that empire; and Gen. Sheridan, the Emperor of Germany, Matthew Arnold, Roscoe Conkling, the French General Bazaine, and the astronomer R. A. Proctor, joined the silent majority.

The Pan-American Congress, held in Washington, was the leading civil event of 1889; the Johnstown flood spread death and destruction in the Conemaugh Valley of Pennsylvania; Brazil became a republic; and a terrible and fatal hurricane occurred in the Samoan Islands.

The inventor, Ericson, died in 1889.

The deaths of that great master of dialectics, Cardinal Newman, Dr. Doellinger, and the writer John Boyle O'Reiley, were the most signal events of 1890. The year that followed saw the hero of the march to the sea, Gen. W. T. Sherman, King Kalakaua of the Sandwich Islands, Charles Stuart Parnell, the Irish leader, and Dom Pedro, Ex-Emperor of Brazil, added to the list of the mighty dead.

Grover Cleveland was again elected president of the United States in 1892. On this anniversary of the discovery of America by Christopher Columbus, was dedicated the beautiful White City at Chicago, for the World's Columbian Exposition, which opened the next year.

In 1893 was settled the Behring Sea dispute between the United States and Great Britain, a grand triumph for arbitration; a revolution occurred in Hawaii, and a republic was formed; Blaine's policy of reciprocity was put into practice by a treaty with Brazil; the American ministers to England, France, Germany, and Italy were raised to the rank of ambassadors; Rome annexed Bokhara; and the dispute concerning the Pamirs was settled.

The American Congress passed a stringent act regulating the immigration of aliens; the Navy was strengthened by the construction of the great ships Monterey, Indiana, Maine, Texas, and Minneapolis; prominent railroad and industrial strikes were terminated; and the World's Columbian Exposition was opened, proving the grandest display of industrial, scientific, and artistic resources and achievements of all the eras of civilization.

More or less civil disturbances occurred in Hayti, Honduras, Nicaragua, San Salvador, Costa Rica, Colombia, and Brazil; the Home Rule bill for Ireland failed in the English Parliament; anarchists committed serious outrages in Barcelona and Rome; the cholera

ravaged Asia and portions of Europe; in Germany a malignant Anti-Semitic agitation occurred; the massacres of Armenians began anew in Turkey; the marvelous telautograph was invented by Professor Gray; and Peary, Nansen, and Jackson fitted out Arctic exploring expeditions.

A financial crisis occurred in the United States, and Congress suspended the purchase of silver bullion under the Sherman act; minor wars prevailed and some bloody conflicts occurred in northern Africa between the natives and European powers; and some diplomatic complications arose from the exclusion of Chinese laborers under the Geary act.

Governor Altgeld of Illinois pardoned the Chicago anarchists; the collapse of Ford's Theater at Washington, the scene of the assassination of President Lincoln, caused the death of scores of persons; a magnificent Columbian Naval Review took place in the Harbor of New York.

The United States Government paid the highest honors to the deceased naval engineer, John Ericsson, the inventor and constructor of the noted Monitor, by conveying his remains to his native land of Sweden on board a man-of-war; Jefferson Davis, the Confederate leader, was buried in Richmond; the World's Parliament of Religions, with representatives present from all the principal faiths of the ancient East, was successful beyond expectation as an adjunct of the World's Columbian Exposition; the Exposition, after six months of great and unvarying success, closed its doors amidst universal regret; the American yacht Vigilant, in her triumphant contest with the British yacht Valkyrie, demonstrated the superiority of American yachtsmen and yacht-builders; Wm. McKinley, afterward president, was elected governor of Ohio; and Congress passed the Wilson bill regulating the tariff.

Canada received a new Governor-General in

the Earl of Aberdeen; Cuba began the insurrection which resulted in her freedom from Spanish rule; the South American republics, which had enjoyed an unusually long term of peace, had this year many incipient insurrections, and Brazil was enduring a chronic insurrection. Peary sailed from America and Nansen from Scandinavia on Arctic exploring expeditions; Sweden celebrated her tercentenary of religious freedom.

In Parliament Irish home rule met another defeat; hundreds of British homes were placed in mourning by the loss, through a colossal blunder, of the battle-ship Victoria with nearly 400 souls, off the coast of Tripoli; the appearance of the cholera spread alarm through the old world; the sleepy old Spanish monarchy was awakened by the agitations of the anarchists, and Vienna had the same alarm; an insurrection of the never quiet Matabeles occurred in South Africa, but ended with the capture of Bulawayo and the defeat of Logenbula, while it brought to the surface Dr. L. S. Jameson, the leader of the raid made later into the country of the Boers, and also exposed the designs of the millionaire-premier, Cecil J. Rhodes. The great Manchester ship canal, having cost \$30,000,000 in its construction, was opened; the cause of imperial federation gained strength in Australia; and photographing in colors took its place among great modern inventions.

America's distinguished dead for this year embraced the great statesman James G. Blaine; Bishop Phillips Brooks, the most eloquent man in his own church, if not in the American pulpit; Ex-President Rutherford B. Hayes; General Benjamin F. Butler; Supreme Court Justice L. Q. C. Lamar; United States Senator Leland Stanford, the founder of California's great university; A. J. Drexel, the philanthropist and financier; Edwin Booth, the great actor; General P. T. Beau-

regard, of Confederate fame; Gen. Rufus Ingalls, of the regular army; Francis Parkman, the historian; ex-Governor and second Secretary of Agriculture Jeremiah Rusk; and Lucy Larcom, the popular romancist.

The death-roll for the year in other lands includes Jules Ferry, the illustrious French statesman; H. A. Taine, the versatile French historian; Guy de Maupassant, the French author; Emin Pasha, the indomitable African explorer; Sir Samuel Baker, explorer of the Nile; C. F. Gounod, the famous composer; Field-marshal MacMahon; and Professor John Tyndall, the philosopher.

1894. This year an extensive railroad strike broke out in the West; terrible forest fires devastated Wisconsin and Minnesota; the Lexow investigating committee unearthed gigantic municipal corruption in New York; the historic Kearsarge was wrecked on Roncador reef; an army of tramps and idlers under Gen. Coxey, a man of local repute, marched from Ohio to Washington; a financial panic agitated New Foundland; Hawaii was proclaimed a republic and the queen dethroned; the war in Honduras was closed, and Prudente Moraes was elected president of Brazil.

In the old world the leading event of the year was the resignation by William E. Gladstone of the premiership of Great Britain. He retired to private life after sixty years of public service. The next event in importance abroad was the foul assassination, by an anarchist, of the universally popular President Carnot of France. Casimir-Perier was chosen president in his place. Dissensions of a serious nature occurred between the new Khedive of Egypt and his British advisers; the dispute over the Pamirs, "the roof of the world," was settled between England and Russia; an attack was made on the life of Premier Crispi of Italy; the brief but bloody war be-

tween China and Japan; the massacres of Armenians by the remorseless Turks began; Nicholas II was proclaimed emperor of Russia; and earthquakes were unusually frequent in different parts of the earth.

America lost in death, this year, many great names, among which may be mentioned those of Prof. William D. Whitney, the learned philologist; David Dudley Field, the profound jurist; Oliver Wendell Holmes, the genial poet; Ex-President McCosh of Princeton University; Prof. David Swing, the popular preacher; Gen. Jubal Early, the Confederate commander; and Madame Albani, the opera singer.

In the European nations the death-list was headed by Alexander III, Emperor of Russia; Chief Justice Coleridge, of England; Count de Lesseps, originator and constructor of the Suez Canal; J. A. Froude, the English historian; Louis Kossuth, the Hungarian patriot; Robert Louis Stevenson, the English novelist; Austin Layard, the discoverer of Nineveh; Rubinstein and Von Bulow, the pianists; Sir John Thompson, the Canadian statesman; and Von Helmholtz, the distinguished anatomist.

1895. No very striking events marked this year's record in our own land. The increasing out-flow of gold to Europe impelled President Cleveland to order another issue of bonds to replenish the requisite treasury balance; negotiations for the settlement of the Behring Sea question made good progress; and the disclosures of municipal corruption in New York made by Rev. C. H. Parkhurst assumed almost national importance.

The United States Supreme Court declared the recently adopted income tax unconstitutional; Atlanta, Georgia, held a very successful Cotton Exposition; and President Cleveland issued a sharp message on the Venezuela boundary question, which had assumed a serious aspect.

The Alaska boundary dispute was revived; Gen. Nelson A. Miles was given the chief command of the army; the yacht *Defender* inflicted another defeat on the *Valkyrie III*; the *Chickamauga* and *Chattanooga* battle-fields were dedicated to the public as memorial parks; Lieut. Peary returned from his Arctic exploring expedition; an extensive strike of trolley railway employees occurred in Brooklyn.

To the south of us in Central and South America, stirring events filled the year. The Cuban insurrection increased in extent, with varying results, but mainly adverse to the Spanish authorities; the insurgents organized a provisional government, and asked recognition from the American Government; the American mail-steamer *Alliance* was fired on by the Spanish officials, the act calling forth a sharp rebuke from our government; and Gen. Campos came from Spain to act as captain-general.

The British temporarily occupied Corinto, Nicaragua, in reparation for the insult to British Vice-Consul Hatch at Bluefields; the boundary dispute between British Guiana and Venezuela assumed a serious aspect; Salvador, Honduras, and Nicaragua completed a scheme of federation; and Brazil protested strongly against England's occupation of the island of Trinidad.

In the old world the British Government had a ministerial crisis, and the tories came into power with the Marquis of Salisbury as premier; the colossal swindler, Jabez Balfour, who robbed the British people of over thirty million dollars, was tried and given a long term of penal servitude; Felix Faure was elected president of France; the Turkish atrocities against the Armenians increased in number and barbarity; Macedonia revolted against Turkish oppression; and in India military expeditions successfully operated against Chitral and Waziristan.

The war between China and Japan, or the "Yellow War," was now all one way, the Japanese carrying everything before them. The battle of Wei-hai-wai and the capture of Port Arthur signaled the final defeat of China, and by a treaty of peace the island of Formosa was ceded to Japan, and China was compelled to pay an enormous indemnity. Subsequently Japan made important commercial treaties with the United States and Russia.

The Italians prosecuted a most disastrous and blunder-filled campaign in Abyssinia; and the British fitted out an expedition to punish the Coomassie government for its barbarities to British troops and other subjects; Dr. Jameson made his most disastrous raid into the Transvaal against the Boers; and France had a ministerial crisis, and a new cabinet was formed with M. Bourgeois at the head.

General Wolseley was promoted to the chief command of the British army; the son of the Ameer of Afghanistan was given a grand ovation on his visit to England; outrages upon and murders of Christian missionaries in China were atoned for by the punishment by death of the perpetrators; and the Emperor of Germany, amid naval and civic displays of the most imposing character, opened the Kaiser Wilhelm canal between the North Sea and the Baltic.

The cholera spread extensively, this year, in Asia and Eastern Europe; England's dispute with Russia concerning the Pamirs was satisfactorily adjusted; and the imprisonment of the former United States Consul Waller in Madagascar, after a healthy agitation and firm protest by our government, was terminated by his release.

The long-continued fraud of the Tichborne case was finally settled for good, as it virtually had been in most observant minds, by the confession of the fraudulent claimant, Arthur

Orton; Prof. Ramsey and Lord Raleigh discovered in England the new element, argon; and an international peace conference was held at Brussels.

Germany yielded up the military dictatorship which she had held over Alsace and Lorraine since their cession to her by France at the conclusion of the Franco-Prussian war, and granted those provinces a partial degree of home rule in representation at the imperial parliament. There was an unsuccessful attempt at insurrection in Hawaii in favor of the deposed queen.

During this year death claimed a varied list from among Americans of merit and distinction. Of our statesmen we yielded up the "Old Roman," Ex-Senator Allen G. Thurman, of Ohio; Walter Q. Gresham, Secretary of State under President Cleveland; and Gen. William Mahone, of Virginia; of our men of letters, Prof. James D. Dana, the illustrious geologist; Eugene Field, the gifted poet; Gen. Adam Badeau, the biographer of Gen. Grant; Dr. S. F. Smith, the author of our national hymn, "America." W. W. Story and Leonard Volk, world-renowned sculptors; Frederick Douglass, the colored orator; H. O. Houghton, the widely famed publisher, and R. M. Hunt, the architect.

Across the ocean the roll of the year's dead embraced Lord Randolph Churchill, the rising and brilliant British statesman; Professor H. C. Rawlinson, who had well earned the title of the father of Assyriology; Prof. Huxley, the great scientist; George Augustus Sala, the novelist; Seeley, the English historian; John Stuart Blackie, the Scotch author; Emily Faithfull, the philanthropist; Alexandre Dumas the younger; Bartholemy St. Hilaire, the French statesman; Marshal Canrobert, the great soldier; Zorilla, the Spanish revolutionist; De Giers, the Russian diplomat; Sergius Stepniak, the Russian exile; Count

Taafe, the Austrian statesman; Stambuloff, ex-premier of Bulgaria, who bravely died defending himself against a gang of subsidized assassins; Ismail Pasha, ex-khedive of Egypt; and Baron Tauchnitz, the famous publisher. To these should be added President Peixotto of Brazil.

1896. The year 1896 will constitute a landmark in diplomacy, in view of the appointment of an American commission to investigate Venezuela's boundary dispute with England.

The unsettled finances of the country necessitated another issuance of \$100,000,000 bonds to cover a deficit in the cash balance in the treasury; Li Hung Chang, the viceroy of China, was warmly welcomed on the occasion of his passage through the United States. St. Louis was visited by a terrible cyclone in the very heart of the city, which caused over 400 deaths and the destruction \$10,000,000 worth of property; and Porfirio Diaz was once more elected president of Mexico.

Gen. Weyler came over from Spain to take charge of the Spanish forces and "make a prompt end" of the Cuban insurrection, which the close of the year, notwithstanding his energetic policy of cruelty, found stronger than when he touched the shores of Cuba, and Gen Lee, our consul, carefully guarded the interests of American citizens in the island.

A cyclone, with serious damage, occurred in Iowa; a cloudburst in Denver, Colo., destroyed thirty lives; a presidential order enabled 30,000 persons to be given places under the civil service law. Immense fires, with great loss of life and property, occurred in the Ontonagon mining district of Michigan and in the lumber regions of Wisconsin; and a large portion of the mining town of Cripple Creek, Colo., was destroyed by fire.

In the old world, France took possession of

Madagascar; the British troops made a disastrous advance into Ashanteeland. The Italians suffered fresh reverses in Abyssinia; the British advanced up the Nile and captured Dongola; and the British fleet bombarded Zanzibar. The Shah of Persia was assassinated by a fanatic. China entered the International Postal Union.

The coronation of the Czar of Russia was an occasion of grand display, unusual even in Russia; but the event was terribly overshadowed by the crushing to death of some twelve hundred persons in the fearful rush to receive gifts from the czar.

A French expedition to the Niger was routed by the natives, many of the French soldiers being killed by poisoned arrows; the German gunboat *Iltis* sank in the Yellow Sea, and 75 lives were lost; and the Philippine Islands arose in revolt against Spain.

In various prominent places in Spain, such as Madrid, Barcelona, Balboa, and others, there were serious outbreaks of popular feeling among students and other classes against the United States, and the American consulates were in two or three instances stoned, and only saved from further injury by the strenuous exertions of the Spanish police.

The persecutions of the Armenians by the Turks were somewhat modified, but still occasionally broke forth in savage fury. American athletes won brilliant triumphs at the revival of the Olympic games of classic Greece, the Greek king delivering the prizes in person.

Dr. L. S. Jameson, favored by Cecil Rhodes, made a raid into the Transvaal, ostensibly for the purpose of making reparation for outrages upon the Uitlanders by the Boer government, but he met with an overwhelming defeat, and afterward submitted himself for trial, on account of his conduct, by a court in England.

The Japanese government thanked the United States for their attitude during its

war with China; the British steamer *Drummond Castle* foundered off the French coast, and out of 247 on board only three escaped; an explosion of dynamite killed 160 persons in Johannesburg, South Africa.

An earthquake in the northern provinces of Japan destroyed thousands of lives and millions of dollars' worth of property.

Dr. Fridthiof Nansen returned from his Arctic exploration, having reached the farthest point touched by any explorer, 86° 14' north latitude, and became the hero of the hour in Europe. A bimetallic conference at Brussels was participated in by representatives from Germany, the United States, France, Great Britain, Austria, Russia, Belgium, Denmark, and Holland.

The list of dead of 1896 in our own land included by no means as many prominent names as that of the year previous. Among the distinguished departed were Harriet Beecher Stowe, the gifted novelist; Rev. Austin Abbott, D. D., the great Biblical critic and Hebrew scholar; Charles F. Crisp, Ex-Speaker of the national House of Representatives; the promising young statesman of Massachusetts, Ex-Gov. William E. Russell; and Henry E. Abbey, the noted opera manager.

Abroad, death claimed such names as George Du Maurier, a great artist and the author of *Trilby*; Baron Hirsch, the Hebrew philanthropist; Arsène Houssaye, the French historian; Millais and Lord Leighton, noted artists; Leon Say, the French statesman; Thomas Hughes, the immortal author of *Tom Brown at Rugby*; William Morris, the poet of progress; and Crouch, the author of *Kathleen Mavourneen*.

1897. Congress assembled after the holiday vacation, and among other acts passed one for the representation of the United States at the International Monetary Conference, and another for the restriction of foreign immigra-

tion; adopted pointed resolutions with reference to the death of Dr. Ruiz, an American citizen, in Cuba. The Senate ratified the treaty between the United States and Japan, and also the extradition treaties with the Orange Free State and the Argentine Republic.

The general arbitration treaty contracted between Secretary of State Olney and the British Ambassador Pauncefoot, having been discussed in Congress at great length, was finally defeated. Congress appropriated \$200,000 for the relief of the sufferers by the unprecedented floods in the lower Mississippi.

William McKinley was inaugurated President of the United States, and selected the veteran John Sherman of Ohio as Secretary of State. The Dawes Indian Commission concluded a treaty with the Choctaw Indians for the allotment of lands in severalty, together with their abandonment of tribal government within eight years.

The President sent William J. Calhoun, of Illinois, as a special commissioner to investigate the condition of affairs in Cuba, especially with reference to the treatment of American citizens resident there. Congress appropriated \$50,000 for the relief of famishing families on that island. A delegation consisting of over sixty citizens of the Central and South American republics visited the United States for the purpose of promoting commercial intercourse between the two great sections of the American continent. A crisis occurred in the Spanish Cabinet, and Sagasta was called to the premiership. Weyler was immediately recalled from Cuba, and Senor Ramon Blanco was sent as Governor-General.

The tomb of Gen. U. S. Grant was dedicated in New York City with imposing ceremonies. The Tennessee Centennial Exposition opened under favorable auspices, and proved a signal success. Several earthquakes occurred in different parts of the country, one extending

through nearly the whole of the state of New York.

Gen. Fitzhugh Lee resumed his duties as United States Consul-General at Havana. President McKinley formally recognized the new Greater Republic of Central America. British warships were ordered to Crete, and they were joined by those of the other great powers, but their presence did not prevent the outbreak of hostilities between Greece and Turkey. After a hot contest on land and sea, which lasted only a few weeks, the Greeks, being overwhelmingly outnumbered, were obliged to capitulate.

The plague made its appearance in India, and became alarmingly fatal. Many Christians were killed in Crete by Mussulmans; Spanish troops killed large numbers of insurgents in the Philippine Islands.

Lord Salisbury consented to the naming by Venezuela of one of the members of the board of arbitration between Great Britain and Venezuela, the member thus named to be an American. Judge Robert A. Van Wyck was elected the first mayor of Greater New York in November, and took his seat on the first of January, 1898, when the charter of the city was formally installed. Great Britain refused to be a party to the seal-fisheries conference if Russia and Japan were invited to participate.

The strike of coal miners in Pennsylvania was marked by a tragedy near Hazleton, September 10. Twenty-one striking miners were killed and forty wounded, some of them fatally, by a sheriff's posse. It seems that a band of marching miners, mostly Slavs, had been previously driven away from the Hazleton workings, after a sharp conflict, and were intercepted as they were on their way to the Lattimer breaker. The posse was under the command of Sheriff Martin. He and his deputies were tried for murder, but were acquitted.

As a result of an attack made by some Chinese upon German missionaries in China, Germany landed troops at Kiao-Chau, China, and took possession of four Chinese forts. Germany still holds the port, and from all indications intends to make it a permanent German port on the Pacific.

The death-roll of the year includes the following well-known names: Ex-Congressman Wm. H. Hatch, a veteran member from Missouri; Gen. Francis A. Walker, the economist, and president of the Massachusetts Institute of Technology; Mrs. Henry Ward Beecher; William T. Adams, better known by his pen-name, "Oliver Optic"; ex-Senator Angus Cameron of Wisconsin; ex-Senator Daniel W. Voorhees; and the oldest member of Congress, Wm. S. Holman of Indiana; Alvah G. Clark, celebrated maker of telescopic lenses; Charles A. Dana, chief proprietor of the *N. Y. Sun*; Neal Dow, the "apostle of prohibition"; the celebrated actress, Mrs. John Drew; Henry George, the economist; ex-Senator John R. McPherson of New Jersey; Justin Winsor, librarian of Harvard University.

In foreign countries: Barney Barnato, large operator in South African gold mines, committed suicide while en route from Cape Town to England; Charles Blondin, the celebrated tight-rope walker; Capt. C. C. Boycott, whose name was the origin of the term "boycott"; Senor Canovas del Castillo, the Spanish premier; Prof. Henry Drummond, writer on Christian ethics; Mrs. Margaret H. Hungerford, the novelist, better known as "The Duchess"; Jean Ingelow, the novelist and poet; Mrs. Margaret Oliphant, celebrated English novelist; Francis T. Palgrave, British poet and essayist; Sir Travers Twiss, author.

1898. Congress reassembled after the holiday recess. The Senate decided to debate the Hawaiian annexation treaty in executive session. The city government of Greater New

York was inaugurated. Marcus A. Hanna was elected senator from Ohio for the long and short terms after one of the most notable fights in the history of the country. In Cuba the provisional government was inaugurated. Li Hung Chang was recalled to power at Peking. General Billot, French Minister of War, made a formal complaint against Zola, the novelist, for his utterances in behalf of Dreyfus. Later Zola was found guilty of libeling the Esterhazy court-martial, and sentenced to one year's imprisonment and a fine of 3,000 francs, the maximum penalty. China sought a loan of \$80,000,000 in London, and offered concessions to the British government. China and Germany came to an agreement on the terms of the cession of Kiao-Chau. President Dole, of Hawaii, arrived in the United States and was entertained by President McKinley. Attorney-General McKenna was nominated by the President to an associate justiceship of the Supreme Court, and John W. Griggs, of New Jersey, was appointed to be attorney-general. In the Senate, Mr. Morgan, of Alabama, introduced a resolution providing for the annexation of Hawaii. The publication of a letter written by Senor Dupuy de Lome, Spanish minister to the United States, speaking insultingly of President McKinley, led to the minister's resignation of his post. On the 14th of February resolutions calling for information on Cuba were passed in both houses of Congress. The day following occurred the destruction of the United States battle-ship *Maine* in the harbor of Havana. It was blown up by a submarine mine. Two officers and over 250 men were killed; 104 survived, but most of them were injured, some fatally. The ship and all her contents were completely destroyed.

The British minister to China protested unsuccessfully against the cession of Port Arthur to Russia, on the ground that it would destroy

the balance of power in China. Senor Polo y Bernabe, the new Spanish minister to the United States, presents his credentials to this government. The Court of Inquiry, appointed to ascertain the cause of the blowing up of the *Maine*, found that the explosion was due to a submarine mine. The court was unable to attach blame to anybody. Captain-General Blanco issued a decree abrogating the reconcentration edict of General Weyler in the western provinces of Cuba. The legislatures of various states appropriated large sums of money for war funds. Pope Leo XIII. offered to mediate between Spain and the Cubans, and urged Spain to suspend hostilities. On the 5th of April Consul-General Lee was ordered to return from Havana. Two days later the Spanish foreign minister stated to the European powers that Spain had reached the "limit of international policy in the direction of conceding the demands and allowing the pretensions of the United States." Orders were issued to concentrate nearly all the regular army of the United States at the gulf ports of New Orleans, Mobile, Tampa, and Chickamauga Park. On the 20th of April President McKinley signed the resolutions of Congress, recognizing the independence of the people of Cuba, and instructing the President to take immediate steps to expel Spain from the island. An ultimatum was sent to Spain the same day demanding that her land and naval forces withdraw from Cuba and requiring an answer before noon of April 23. The Spanish minister at Washington requested and received his passports. On the day following the United States minister to Spain, General Woodford, was presented with his passports before he had the opportunity to present the ultimatum to the Spanish government. The United States declared the ports of Cuba blockaded, and on Monday a formal declaration was made by Congress and signed by the President.

John Sherman resigned as Secretary of State, and Judge William R. Day was appointed to succeed him. The Spanish-American War was under way by the first of May, and upon that day Commodore Dewey, commander of the United States naval forces in the Pacific, won a signal victory over the Spanish in Manila Bay. On the 8th of May Miss Helen Gould, of New York, sent her check for \$100,000 to the Treasury Department, with instructions to use the same for war purposes. Commodore Dewey was promoted to be rear-admiral and also was given the thanks of Congress. On May 11th the first fatality in the American war occurred at Cardenas, where the vessels, *Wilmington*, *Hudson*, and *Winslow* were attacked by the Spanish gunboats and shore batteries. Ensign Bagley and four sailors were killed and others were wounded. On the following day Admiral Sampson bombarded San Juan, Puerto Rico, and on the 13th the Flying Squadron under Commodore Schley sailed from Hampton Roads. Then began the search for the Spanish squadron, recently arrived in American waters, which resulted in the shutting up of Admiral Cervera's fleet in the harbor of Santiago. On the 18th of May the cruiser "*Charleston*" set sail for the Philippines to reinforce Admiral Dewey, and later in the month several thousand troops left San Francisco for Manila. Nothing else of special note, except a few bombardments of shore batteries, occurred during the month of May. Foreign events of importance during the month were the signing of the protocol by Russia and Japan, which recognizes the independence of Korea. The second Zola trial was begun in Paris; Great Britain took possession of the Port of Wei-Hai-Wei, China, and on the last day of the month the reciprocity treaty between France and the United States was announced.

On June 1st Admiral Sampson joined Commodore Schley at Santiago and took command

of the united American fleets. Two days later Lieutenant Hobson made his daring entrance into the harbor of Santiago, sinking the collier "Merrimac" in the channel. On the 7th of June the cruiser "St. Louis" cut the cable off the Port of Caimanera. Three days later the first landing of American troops on the Island of Cuba occurred near the entrance of Guantanamo harbor. Six hundred American marines formed a camp, which they called Camp McCalla. The next day this camp was attacked by Spanish forces and four Americans were killed. The fighting was continued the following day. On the 13th a portion of the first military expedition left Tampa, Fla., for Santiago harbor, Major-General Shafter being in command of the expedition. The fleet off Santiago continued to bombard the ports and batteries. On the 20th of June the United States troopships reached Santiago, and General Shafter, Admiral Sampson, and General Garcia, commander of the Cuban forces, held a conference at Aserradero. The following day the troops began landing at Baiquiri. On the 25th of June the monitor "Monadnock" sailed for Manila to reinforce Admiral Dewey. The following day the Rough Riders were ambushed and several killed. On the 27th of June the third Manila expedition sailed from San Francisco with troops. On the 29th Major-General Merritt sailed from San Francisco for the Philippines, and on the same day 8,000 men under General Snyder sailed from Tampa to reinforce General Shafter at Santiago. Domestic affairs for the month of June included the collapse of the great Leiter wheat corner in Chicago on the 13th. The United States paid \$473,151 to Great Britain, this being the amount of the Bering Sea award. Foreign events of importance included the defeat of the Australian Federation on account of the refusal of New South Wales to join the other colonies. Joseph

Chamberlain declared in a speech in the House of Commons that his address advocating a British-American alliance had the sanction of Lord Salisbury. A British expedition into Sierra Leone punished the natives for outrages to American missionaries.

The month of July was the most interesting in the history of the Spanish-American war, and the events of this month brought the war to a close. On the first day of the month the heights of El Caney and San Juan, overlooking Santiago, were taken by American troops. At the latter place the Rough Riders and the 1st and 10th regulars carried the hill by storm. The following day the Spanish attempted to retake San Juan Hill, but were repulsed. The 3rd of July was most disastrous for the Spaniards because of the complete destruction of their fleet of war vessels which attempted to escape from the harbor of Santiago. On the same day General Shafter notified General Toral, commanding the Spanish forces at Santiago, to remove from the city all non-combatants, as he was about to shell the city. On the 4th of July a truce was established between the two armies. This was finally extended in order to permit the Spanish general in command to communicate with Madrid in regard to capitulation. On the 9th General Toral offered to surrender the city of Santiago if his troops were allowed to walk out with their arms. This proposal was declined. On the 14th General Toral surrendered on the basis that Spanish troops be returned to Spain. The territory to be surrendered included all the eastern part of Cuba with the Spanish forces located therein. On the 15th of July four Manila expeditions sailed from San Francisco under command of General Otis, and two days later the city of Santiago was formally surrendered to General Shafter, and the United States flag was hoisted over the palace. On the 20th General Miles

sailed from Santiago, where he had recently arrived to confer with General Shafter, to Puerto Rico. On the 25th this expedition effected a landing on the south coast of the island. For the most part the conquest of Puerto Rico was more like a holiday excursion than a military expedition, the inhabitants welcoming the troops with joy. On the 25th of July the French ambassador, M. Jules Cambon, on behalf of the government of Spain, presented to the President a message designed to inaugurate negotiations for peace. During the latter part of the month the troops in the Philippines began to close in upon the city of Manila, and several skirmishes between the Spanish and Americans took place. The 4th of July was celebrated with more spirit throughout the country than at any time since the beginning of the Civil War. The second session of the 55th Congress adjourned. In China a rebellion was reported in some of the western districts. In France the trial of Zola was finished and he was sentenced to a year's imprisonment and a fine of 3,000 francs. The Earl of Minto was appointed governor-general of Canada to succeed Lord Aberdeen.

Early in August five volunteer regiments of immunes were ordered to Santiago for garrison duty. On the 7th of August Admiral Dewey and General Merritt demanded the surrender of Manila, which was refused. On the same day Spain's reply to the president's statement of the terms of peace was sent to Paris for transmission to Washington. On the 10th Secretary Day and M. Cambon agreed on the terms of a peace protocol to be transmitted to Spain for approval. This protocol, suspending hostilities, was signed the following day at Washington. On the 13th the troops under General Merritt and the fleet under Admiral Dewey made a simultaneous attack upon Manila and after six hours' fighting the Spanish surrendered the city with

about 7,000 prisoners. John Hay, ambassador to Great Britain, accepted the secretaryship of state to succeed William R. Day, who was appointed to represent the United States in the peace negotiations with Spain. On the 20th a naval parade of Admiral Sampson's fleet took place in the harbor of New York. In foreign countries the following events of interest took place: George N. Curzon was appointed to succeed the Earl of Elgin as governor-general of India. The residents of the Island of Jamaica prepared an appeal to the British Parliament in favor of annexation to the United States. On the 28th of August the Czar of Russia issued his address to the powers seeking the disarmament of all Europe. Wilhelmina, on the last day of August, was proclaimed Queen of the Netherlands.

On September 9 the President appointed as peace commissioners, William R. Day, of Ohio, and Senators Frye, of Maine, Davis, of Minnesota, Gray, of Delaware, and Mr. Whitelaw Reid, of New York. On the 20th, the evacuation of Puerto Rico began. On the 24th the commission appointed by the president to investigate the conduct of the war met at Washington. The grand total of deaths from all causes during the war from May 1 to September 30 was 2,910. The number of wounded was 1,577. The leading domestic events of the month included the removal of the restriction from Spanish vessels; the awarding of contracts for building three new warships; resignation of Secretary of State Day to accept the chairmanship of the American Peace Commission; and the arrival of Agoncillo and Lopez, representing Aguinaldo, in the interest of securing the recognition of the independence of the Philippines. In Egypt the battle of Omdurman occurred on the 4th of September between the Anglo-Egyptian forces in the Sudan and the Dervishes. In this battle the latter were severely defeated and lost over

10,000 men. Two days later war broke out between the Christians and Mussulmans at Candia, Crete. Li Hung Chang was dismissed from the foreign office of the Chinese Empire by the emperor on the 10th of September, and on the same day the Empress Elizabeth of Austria was assassinated at Geneva, Switzerland, by an Italian anarchist. On the 22d of the month the Emperor of China resigned his authority to his mother as regent.

On the first of October the American and Spanish Peace Commissioners held their first joint meeting in Paris. Two days later Senator Quay, of Pennsylvania, gave bail to appear for examination on the charge of conspiring for the misuse of the funds of the Peoples Bank of Philadelphia. On the 17th of October the degree of LL. D. was conferred on President McKinley by the University of Chicago. The following day the United States flag was hoisted over the ports and public buildings of Puerto Rico. On the 28th an expedition of 78 officers and 778 men sailed from San Francisco for Manila. The cost of the Spanish war from the beginning to the 31st of October amounted to \$164,932,228. Early in October proceedings for the re-opening of the Dreyfus trial began in Paris, and the ultimatum signed by Great Britain, France, Italy, Russia, demanding the Turkish evacuation of Crete was presented to the Sultan. On the 12th of October the German emperor started on his journey to Palestine, and on the 29th he entered Jerusalem through the Jaffa Gate.

On the 28th of November the Spanish Peace Commissioners accepted the terms demanded by the United States. During the same month the Earl of Minto arrived in Canada to succeed Lord Aberdeen as governor-general. The effort to establish a government, to be known as the United States of Central America, by Nicaragua, Honduras, and San Salvador, failed on the first day of the month after a few days' trial.

On the 10th of December Gen. Fitzhugh Lee embarked at Savannah with his staff for Havana. On the following day the ashes of Columbus were removed from the Havana cathedral to a Spanish warship for transportation to Spain. During the same month the Mexican mission in the United States was raised to an embassy. On the 12th of December Major-General Ludlow was appointed first military and civil governor of Havana, and the day following Major-General Brooke was appointed military and civil governor of Cuba, and on the same day Gen. Fitzhugh Lee arrived at Havana. On the 8th of December, Joseph Chamberlain, secretary of state for the British colonies, in a speech advocated an alliance with Germany, Russia, and the United States.

1899. On the first day of the year formal cession of Spanish sovereignty in Cuba was made to the United States at Havana. Seven days later Aguinaldo, leader of the Philippine insurgents, issued a proclamation in Manila protesting against American occupation of the Philippines, alleging that American promises of independence had been violated, denouncing President McKinley's instructions to General Otis, and calling on the Filipinos to continue the struggle for liberty. Later in the same month prominent Cubans were appointed to office in Havana by General Ludlow. Capt. Richard P. Leary was assigned to duty as military governor of the Island of Guam and commander of the U. S. naval station to be established there. In the senate the treaty with Spain was favorably reported.

Joseph Choate, of New York, was appointed ambassador to Great Britain. In foreign lands the following events of importance occurred during the month of January: An uprising took place in the Samoan Islands for the possession of the crown. The convention between Great Britain and Egypt, as to the government of the re-conquered provinces in the Sudan, was signed at Cairo.

In the early part of February the Filipinos made an attack upon the American lines near Manila and were driven back with great loss. Their positions were stormed the next day and it was reported on the 7th of February that the rebels were in full retreat. Throughout the month the American forces continued to pursue the insurgents, taking town after town. The war department provided for the mustering out of about 15,000 volunteer soldiers. An army court of inquiry was appointed to investigate the charges of General Miles in reference to the beef supply. In France street riots, arising from the Dreyfus agitation, took place in Marseilles. The Spanish Cabinet voted to abolish the office of minister of the colonies. On the 18th of February M. Emile Loubet was elected president of the French Republic to succeed M. Felix Faure.

On the 1st of March the Sagasta ministry in Spain resigned office on the question of ceding the Philippines, and Senor Silvela was asked to form a new cabinet. The American troops continued to repulse the Philippine insurgents. On the 15th of the month the Spanish cabinet decided to ratify the peace treaty, and two days later the queen regent signed it. The American troops attacked the Filipinos nearly every day throughout the month, always with favorable results. On the 3rd of the month Rear-Admiral Dewey was made Admiral of the Navy under an act of Congress, and General Otis was promoted to be a major-general by brevet. On the 17th of March the Windsor Hotel in New York city was destroyed by fire with terrible loss of life.

On the 4th of April the American commissioners to the Philippines issued a proclamation stating the intention of their government in dealing with the islands. The government at Washington decided to send 14,000 regular troops to reinforce the army in the Philippines. The Cuban Assembly voted to disband the

army and to dissolve. Mayor Carter H. Harrison was re-elected in Chicago, and the Mazet Investigation Committee of New York began its inquiry into the Tammany legislation of New York city. Hon. Thomas B. Reed announced his retirement from public life. In Paris the managers of the "Figaro" were fined for publishing testimony in the Dreyfus case. A force of British and Americans were ambushed by a band of Samoans on a German plantation near Apia, Samoa. On the 11th of April ratifications of the treaty of peace between Spain and the United States were exchanged at Washington, and the president issued a proclamation declaring war at an end. Marconi's system of wireless telegraphy was successfully tested across the English Channel during a storm. On the 26th Col. Frederick Funston of the Twentieth Kansas with volunteers from his regiment crossed the Bagbag River by crawling along the iron girders of the bridge and dispersed the Filipinos at that point. The following day Colonel Funston with 120 men of the same regiment swam across the river under a galling fire from the insurgents and drove back their forces. On the 28th the Filipinos asked for a cessation of hostilities until their congress could act on terms of peace. General Otis declined to recognize the Filipino government, demanding unconditional surrender. His action was commended by the President.

Early in May a general forward movement in the Philippines was begun and the Filipinos retreated from town to town, removing their so-called capital with them. On the 20th of May Admiral Dewey sailed from Manila on his return voyage to the United States. The government of Morocco settled the claim of the United States upon the demand of the cruiser "Chicago" at Tangiers. On the 18th of May the peace conference called by the Czar of Russia assembled at The Hague. Its

deliberations continued for more than two months, and resulted in establishing an international court of arbitration. Captain Dreyfus was brought back from Devil's Island and tried before a court-martial at Rennes, France, but was again convicted and sentenced to ten years' imprisonment. The government, however, set him free. Spain sold the Marianne Islands to Germany. The Czar of Russia named his brother, the Grand Duke Michael, as heir to the throne. In August the Yaqui Indians in Northwestern Mexico rose in revolt on account of encroachments on their lands. A revolution was started in Venezuela by the professional revolutionist, General Hernandez. War broke out between the Boers of the South African Republic and Orange Free State and the British. The Boers at first met with considerable success. The U. S. War Department took the census of Cuba and Porto Rico.

1900.—The last year of the nineteenth century was one of the most eventful in the world. In the United States the chief events of the year were the ratification of the treaty for the partition of the Samoan Islands and the appointment by President McKinley of a new commission to the Philippines.

At the political conventions of the year the leading parties brought out the following candidates: Republican, Wm. McKinley and Theodore Roosevelt; Democratic, Wm. J. Bryan and Adlai E. Stevenson; Prohibition, John J. Woolley and Henry B. Metcalf. The election resulted in the choice of McKinley and Roosevelt, the Republicans securing 292 and the Democrats 155 electoral votes.

A plan of government was adopted for Porto Rico, and Charles H. Allen of Massachusetts was appointed governor. The canal commission appointed by the government to investigate routes for an Isthmian canal reported in favor of the Nicaragua route. The foreign

commerce of the United States for the fiscal year exceeded that of any preceding year and the grand total of the imports and exports exceeded \$2,000,000,000. Among the most eminent Americans who died during the year were Senator Cushman K. Davis of Minnesota; Rear-Admiral John W. Philip of the United States Navy; John Clark Ridpath, the noted historian; John Sherman, and Charles Dudley Warner, the famous writer.

The leading events in foreign countries were the annexation of the Orange Free State and South African Republic to the British Empire, the federation of the Australian colonies and Tasmania, the Paris Exposition and the Boxer uprising in China. India experienced a serious and disastrous famine and in South America the republics of Venezuela and Colombia suffered from rebellions and revolutions. The constitution providing for an independent government was adopted by Cuba, and in Italy King Humbert was assassinated.

Among the noted people of foreign countries who died during the year were the Duke of Argyle; Richard D. Blackmore, author of *Lorna Doone*; Marshall Campos, the noted Spanish general; Baron von Ketteler, German minister to China; Archibald Forbes, the famous English war correspondent; Humbert I. of Italy, assassinated; James Martineau, the celebrated philologist; St. George Mivart, the distinguished scientist; John Ruskin, the famous art critic and author; Baron Russell, Lord Chief Justice of England; and Sir Arthur Seymour Sullivan, the famous English composer.

1901.—The first year of the twentieth century was an eventful one along the lines of industrial, commercial and social projects. The most important events in the United States were the passage of the army reorganization bill; the new appointment bill, passed by the fifty-sixth congress, which increased the number of representatives to 386; the inauguration of President

McKinley and Vice-President Roosevelt on March 4th; the assassination of President McKinley on September 6th and his death on the 14th of the same month, thus placing the administration in the care of Vice-President Roosevelt. The fifty-seventh congress elected David B. Henderson of Iowa speaker of the House of Representatives and Wm. P. Frye of Maine President of the Senate. Early in the year the Senate ratified the Hay-Pauncefote treaty with England, which abrogated the Clayton-Bulwer treaty and provided for the absolute control by the United States of an Isthmian canal.

Industrially the year was marked by the consolidation of railways and the formation of several great manufacturing corporations, among which was the United States Steel Corporation with a capital of over a billion dollars, and the formation of the Northern Securities Company.

The Pan-American Exposition was held at Buffalo from May 1st to November 1st and was an important event in bringing together the American republics. It was followed by the Pan-American Congress at Mexico.

The first territorial Legislature met in Hawaii March 1st. Continual progress toward the pacification of the Philippine Islands was made during the year, and on July 4th civil government was inaugurated by the commission in twenty-seven provinces. The first election was held under the new Cuban constitution and Thomas Estrada Palma was chosen the first president.

In foreign lands the important events were the death of Queen Victoria and consequent enthronement of the Prince of Wales as Edward VII, the completion of the Trans-Siberian railway and the opening of the first parliament of the commonwealth of Australia under the new constitution. In the Far East the Boxer rebellion was subdued.

1902.—In general the year 1902 was charac-

terized by the prosperity which attended 1901, though there was not such a marked increase of industries as there was in 1901 over those of previous years. The important events in the United States were the establishment of a permanent census bureau and the repeal of the war revenue tax. The charters of the national banks were extended, the Chinese exclusion law was reenacted, provision was made for the construction of the Panama Canal and an important irrigation law was passed and also a law for extending and perfecting civil government in the Philippine Islands.

Several changes occurred in the President's cabinet. Henry C. Payne of Wisconsin succeeded Charles Emory Smith of Pennsylvania as postmaster-general, and William H. Moody of Massachusetts succeeded John D. Long of the same State as secretary of the navy. In our diplomatic corps the most important changes were the resignation of Honorable Andrew D. White as United States Ambassador to Germany and the appointment of Honorable Charles Magne Tower, who was at the time our ambassador to Russia, to fill the position at Berlin.

The relations of the United States with foreign powers during the year were cordial to an unusual degree and the influence of the nation along the lines of civil and industrial progress was the most marked of any year in its history.

The affairs of our island possessions were prosperous and progressive. During the year American government was firmly established in Porto Rico and a system of civil government which gave the natives a larger share in the affairs of state than they ever before experienced was fully established in the Philippines.

Cuba became an independent nation and during the year its government was thoroughly organized. The South American countries succeeded in settling the disputes with which

they began the year. Venezuela, however, was disturbed by difficulty with Great Britain and Germany, on account of debts due the subjects of these nations. Military measures were taken by these powers to enforce their claims and the custom house was seized and a blockade established.

In Europe the most important events were the settlement of a South African difficulty by Great Britain, the coronation of the King and Queen, the resignation of Lord Salisbury as Premier of Great Britain and the appointment of Right Honorable Arthur James Balfour as his successor. In Germany a serious industrial depression continued through the year, and France experienced a change of ministers and enacted the laws which resulted in closing many schools under the charge of religious orders. The Triple Alliance or Dreibund was continued. Alfonso XIII was crowned as King of Spain.

Japan formed a strong alliance with Great Britain, and several local rebellions occurred in China.

The commercial and industrial activity of 1901 was continued through 1902. The foreign trade of the United States showed a total of exports of \$1,340,000,000 and of imports of \$950,000,000. A few large corporations were formed, though not as many as during the previous year. The most important of these was the International Mercantile Marine Company, which was a corporation of corporations, combined for the purpose of controlling five of the most important transatlantic lines of steamers.

The most important event in the scientific world was Marconi's successful experiment in wireless telegraphy, in which he succeeded in sending and receiving messages across the Atlantic. The great Nile Dam at Assouan was completed, and the most important engineering work in the United States was the com-

pletion of the Sault Ste. Marie power canal. The most noted men who died during the year in the United States were John P. Altgeld, Ex-Governor of Illinois; J. Sterling Morton, former secretary of agriculture; Senator James McMillan of Michigan; Thomas Nast, the cartoonist; and Honorable Thomas B. Reed of Maine, the famous Speaker of the national House of Representatives. To these must be added Admiral William T. Sampson and General Franz Sigel, who was a prominent officer in the civil war. Among prominent writers who died during the year were Frank R. Stockton, Bret Harte, Paul Leicester Ford, Edward Eggleston and Frank Norris. Among the eminent divines were Reverend Thomas De Witt Talmage, Reverend William Taylor, Archbishop Feehan of Chicago, and Archbishop Corrigan of New York. England lost the Marquis of Dufferin and Ava, one of her leading statesmen and former Viceroy of India; Lord Pauncefoot, ambassador to the United States; Cecil J. Rhodes of South Africa; Reverend Joseph Parker of London and Right Reverend Frederick Temple, Archbishop of Canterbury.

1903.—The year 1903 was devoid of any great national events or world-wide movements in the interests of civilization, yet it was a year of steady, solid prosperity. The important events in the United States were the establishment of the new government Department of Commerce and Labor, the reorganization of the army by the establishment of a general staff, the ratification of reciprocity treaties with Cuba, France, Argentina, the British West Indies and Canada. The fifty-eighth congress convened in extra session on November 9th and elected Joseph G. Cannon of Illinois as Speaker of the House of Representatives. There were several changes in the cabinet. Honorable George B. Cortelyou was appointed Secretary of Commerce and Labor and Honorable Elihu

Root was succeeded by Judge William H. Taft as secretary of war.

The diplomatic history during the year was a cause for national congratulation. The United States was instrumental in securing the reference to the Hague Tribunal of the trouble which at the beginning of the year was threatening Venezuela, and by this tribunal the difficulty was satisfactorily adjusted. The vexing Alaska boundary question was settled by a judiciary tribunal appointed conjointly by the United States and Great Britain, and the efforts of Honorable John Hay, Secretary of State, secured the ratification of a treaty with China by means of which the "open door" in the Far East is assured. The affairs in our island possessions were quiet and continually prosperous.

With the exception of Venezuela and Colombia, the countries of South America gave their attention to the development of their resources and the avocations of peace. Colombia's difficulties were political rather than military, and were caused by her rejection of the treaty with the United States, providing for the construction of the Panama Canal. This led to the secession of the State of Panama and its establishment as an independent republic.

The most important events connected with Great Britain were the passage of the Irish Land Bill and Mr. Joseph Chamberlain's advocacy of a protective tariff; the industrial conditions of Germany were somewhat improved over those of the previous year; France experienced practically no change during the year; Russia was torn by civil dissension and turmoil, and the massacre of the Jews at Kishineff was of such a nature as to bring forth vigorous protest from other civilized nations.

In the Far East the strained relations between Russia and Japan continued to grow more tense as the year neared its close and each na-

tion was actively engaged in preparing for war.

In Africa the affairs of the Congo Free State were such as to call the attention of several European governments to the mal-administration of the state under the control of the King of Belgium, and in South Africa affairs progressed favorably.

Commercially and industrially the year in the United States was very prosperous, the combined domestic and foreign trade even exceeding that of the previous year, though there was some falling off in exports.

The most noted discovery during the year was that of the properties and uses of radium by Professor and Madame Curie. The completion of the American Pacific cable was the most important engineering work and places the United States in direct communication with the Hawaiian and Philippine Islands.

Among the noted Americans who died during the year were General W. F. Smith and General Alexander McDowell McCook, both of whom were prominent Federal officers during the Civil War. The Methodist Bishops Foster and Hurst died during the year, also Bishop Thomas Clark of the Episcopal church and Reverend William Henry Milburn, who was for many years chaplain of the United States Senate.

Among the most noted foreigners who died were Pope Leo XIII; Marquis of Salisbury; Sagasta, the venerable Ex-Premier of Spain; Herbert Spencer, the noted philosopher; Alexander Bain, the psychologist; and Paul Du Chaillu, the celebrated traveler and explorer. Of the literary men of note who died during the year were the historians Mommsen and Lecky; the newspaper correspondent, "Max O'Rell", whose real name is Paul Blouet; Richard Henry Stoddard, the poet and essayist, and Noah Brooks, whose books are familiar to many readers in America and Europe.

CHAPTER XV.

THE PROGRESS OF THE CENTURY.

Divisions of time as marked by the calendar are at best arbitrary when considered in their relation to events. In the light of its relation to human history, no day, month, year, decade, or century can stand alone. The events which have culminated in any period reach back to the preceding period and often to the remote past for the causes of which they are inevitable results. They also extend their influence to the future and are potent in shaping the movements of periods yet to come. Human history knows no arbitrary demarkations of time; it is a record of the evolution of the race, and this evolution is the result of all the forces of nature and society, so intermingled in their formation of the progress of events that it is usually impossible to determine where the influence of one ends or the source of another begins.

In a review of the century as brief as the limits of this article necessitate, it is impossible to trace through the previous century those great movements which are so intimately associated with the great political, social, and industrial changes of the nineteenth century that they really form a part of them. Neither

is it within the province of the article to trace the various relations existing between the lines of progress discussed, or to show how, by the process of evolution, each has assisted in the development of the others. The discussion of the various topics under separate heads does not, therefore, imply a lack of their organic union into a complete whole; a whole which indicates along general lines the progress of the race during the last hundred years.

HISTORY.

In the realm of history the nineteenth century represents the period in which were developed and applied two great fundamental ideas in the building of nations. These are democracy and nationality. In order that we may understand this, a brief survey of the political and commercial conditions of Europe during the last quarter of the eighteenth century is necessary.

Previous to the French Revolution of 1789, all the governments on the continent were absolute monarchies. Society was divided into two classes. One, the aristocracy, or privileged class, who were few in number, but

owned all the land except such as belonged to the church, and ruled the great masses with an iron hand; the other the proletariat, which comprised the great mass of the people. Their privileges were to pay taxes, serve their lords, fill the ranks of the army, and obey the laws. The aristocracy were exempt from taxation and from militia duty, and besides considered themselves free from any obligation to respect the rights or privileges of the peasantry.

Excepting *Russia* and *France*, there was on the continent of Europe no nation held together by a distinctly national idea. All the apparently great powers were mere loose confederations of petty kingdoms and principalities, having no organic union. The Holy Roman Empire of the West, extending from the *Baltic* to the *Mediterranean*, was the largest of these confederations. It comprised what is now the most of *Germany*, all of *Belgium*, and the western part of *Austria*. The leading powers in this confederation were *Prussia* and *Austria*, but there were many small states, some of which had an area less than that of a Dakota wheat farm. Nevertheless, the kings of these little domains ranked on a par with the rulers of great nations. *Prussia* and *Austria* were politically and religiously antagonistic. *Italy* existed as a peninsula, but not as a nation. The territory which she now occupies was possessed by a collection of independent states, intensely jealous of and antagonistic to each other. Into these conditions the French Revolution came as a great eruptive force, destined not to overthrow states, but to destroy rules and aristocracies, that empires might arise.

FRANCE.—The royal treasury of France had been bankrupt for years when in 1789 *Louis XVI* called together the States General. The refusal of the nobles and clergy to act with the third estate so as to give them their full share of influence caused a withdrawal of the

representatives of the great middle class of people from the States General and their establishment of the National Assembly. This was the beginning of the Revolution. The National Assembly abolished all feudal customs and privileges and church tithes. Church lands were confiscated and religious toleration was decreed. The king was retained, but all legislative power was vested in a single chamber chosen by vote of the people. France was changed from an absolute to a limited monarchy. The excesses which followed—the execution of the king, the Reign of Terror under *Robespierre*, with all their terrible effects—were only ephemeral. The French people had obtained an idea of democracy. *Napoleon* was beginning to show his powers, and the nations of Europe were alarmed.

Under the Directory and the sway of *Napoleon*, France again returned to an almost absolute monarchy, yet she was the dominant power of Europe. With the overthrow and exile of *Napoleon*, the old Bourbon dynasty returned to the throne with *Louis XVIII*, as king. But the king and his court found themselves in a new world. The privileges of the old nobility and the special rights of the Church and the merchants' guilds had been swept away, and during the quarter of a century following the Revolution, a generation had grown which knew them not; they could not be restored. The idea of equality had permeated French society, and the Code *Napoleon* had given it legal standing. The nobles attempted gradually to restore the old regime. At the death of *Louis* in 1824, the leader of this reactionary party ascended the throne as *Charles X*. His extreme measures hastened his downfall, and in 1830 the chambers convened, elected *Louis Phillippe*, Duke of Orleans, as the succeeding king, and *Charles* and his sons were obliged to abdicate.

The first years of the reign of *Louis Phillippe*

were successful, but he soon proved incompetent, and in 1848 was overthrown, and the second republic established with *Louis Napoleon Bonaparte* as president. Napoleon so manipulated affairs that the republic yielded to the second empire in 1853. He became emperor under the title of Napoleon III. The second empire continued until the disastrous war with Germany in 1870-71. Following the defeat at Sedan, the emperor and his legislature vanished. A provincial government was established; the best terms possible were made with Germany, and then the third republic was launched on a firm basis. After nearly a century, the principles of the Revolution were established in France. They had also become a guiding influence in shaping the plan of government for the other great countries of Europe.

GERMANY.—The dawn of the century found the German states under control of the institutions of *feudalism*. The area now occupied by the *German Empire* was a part of the Holy Roman Empire of the West, and later of the Rhinish Confederacy. Austria was the controlling power in German affairs of state, and Prussia was the only other kingdom of any strength. The kingdoms conquered by Napoleon had been strongly influenced by his rule, and the political ideas which were spread abroad through his administration remained after France was driven back within her original boundaries. The institution of feudalism had been replaced by a fair and equitable system of jurisprudence and a representative form of government.

Prussia took the lead in those reforms which led to the establishment of the German Empire. Class and guild restrictions on the purchase of land and upon industries in general were abolished; religious liberty was sanctioned; a system of local self-government was established, and a universal military service

required. These measures and the devotion and patriotism of her people enabled Prussia to appear at the *Congress of Vienna* in 1814 as a state of the first rank, although she had a population of only 5,000,000. The Congress of Vienna united the German states and cities into the German Confederation with the provision that each state should form a representative government. Only a few of the south and central kingdoms complied with this provision, and from 1815 to 1866 the history of Germany is a history of popular revolutions, through which the people gradually secured their political rights. An attempt to form the North German Confederation in 1850 failed because Austria was the controlling power in the old organization. But *Bismarck* was rising in Prussia, and under his leadership Austria was forced into a war in 1866, in which she was signally defeated and driven from the Confederation. The war with France in 1870-71 brought the south German kingdoms into a union, and the annexation of *Alsace* and a part of *Lorraine* increased the territory of the empire.

ITALY.—Under the leadership of *Cavour* and *Garibaldi*, the Italian states had been approaching a union. This measure was opposed by Austria, but her defeat in 1866 destroyed her influence in Italian affairs, and was one of the most important steps in the formation of a united Italy, which was consolidated in the years immediately following.

GREAT BRITAIN.—At the beginning of the century England was an impoverished and backward country. She had a population of 10,000,000, oppressed with an enormous debt. She had lost her most valuable colonies and was involved in international controversies. Property was so unevenly distributed that the greater part of the people were paupers, while legislation was in the hands of the wealthy class. Though she was nominally under a

representative government, the House of Commons in no wise represented the people. Democracy was frowned upon, and aristocracy ruled. Yet from these conditions has developed during the century the England of today—a nation great in literary achievements, superior in industry, commerce and wealth, and ruling an empire which girdles the earth. Moreover, all this has been accomplished without insurrection or bloodshed. What France secured by revolution and war, England has gained by evolution and legislation; and the results of the changes so peacefully and gradually wrought have been more far-reaching than those secured by violence.

A reorganization of the House of Commons whereby it became a truly representative body; a gradual extension of franchise until it became nearly universal; the adoption of a secret ballot; the placing of the control of the government in the hands of the great middle classes; the adoption of a colonial policy that has given practical independence to *Australia* and *Canada*, and placed *India* almost entirely under the government of its native people; the abolition of the slave trade in her colonies; the establishment of the government on a sound financial basis; the development of an industrial and commercial system that for a time made her the foremost commercial nation of the world, and the establishment of a national system of universal education, are among the most important steps in England's progress in the nineteenth century.

THE UNITED STATES.—As England was the originator of representative government, so has the United States been the country in which the system has been brought to its greatest degree of perfection. The century began with the United States fairly established under the Constitution which *Gladstone* has called "the most wonderful work ever struck off at a given time by the brain and purpose of man."

When the United States became a nation she was without credit at home or standing abroad. Under the leadership of *Washington* and *Hamilton* the new republic gained both credit and recognition. There was, however, strong opposition to the measures adopted by these statesmen and by the *Federal Party* in general. At the beginning of the century the opposite party, or *Republicans*, came into power, with *Jefferson* as president. They favored strong state governments, and were opposed to a strong national government; but Jefferson at one sweep set aside the principles of his party, and more than doubled the domain of his country by the purchase of *Louisiana*. The trouble with France and England was adjusted without war, but a national sentiment sprang up as the result. This culminated in the War of 1812, during *Madison's* administration. This war strengthened the feeling for a national government, and gave the country standing abroad. When the *Monroe Doctrine* was proclaimed, Europe understood that it expressed the policy of a nation instead of a confederation of states.

From 1815 to 1860 the country progressed along the lines of industry and commerce, yet this development contained the seeds of the Civil War. The invention of the *cotton gin* made the raising of *cotton* profitable, and this was conducive to the increase of slave labor and led to the wide extension of *slavery*. The South became the home of large plantations worked by slaves. The proprietors were wealthy and constituted an aristocracy. Manufactories were a failure because they were unprofitable and the industries of this section were wholly agricultural. The North, on the other hand, was a land of small farms worked by their owners, of numerous villages and cities containing thriving manufactories. Two industrial systems so entirely opposite could not continue in harmony under the same govern-

ment. Each soon began to fear and be jealous of the other. The extension of slave territory by the purchase of *Florida* in 1821; the annexation of *Texas* in 1845; and the discovery of gold in *California*, and consequent rapid settlement of the territory with its application for admission into the Union led to a clash between the North and the South in 1850. This resulted in the *Missouri Compromise*. The Kansas-Nebraska Bill practically repealed the most important feature of the compromise of 1850, and the conflict which followed was but an omen of the great war which was soon to break forth. With the election of *Lincoln* the Civil War was launched. The great struggle devastated the South and nearly bankrupted the nation, but it left a united country. The Constitution was so amended as to secure to the negroes their rights as freemen. The seceding states resumed their places in the Union; the credit of the nation was regained; *Alaska* was added to our domain, and the country moved on in peace and prosperity.

Since the Civil War, the problems of the nation have been financial and industrial rather than military. The growth and prosperity of the United States in the last quarter century have been the most stupendous in all history. The war with Spain showed that there was no longer any North or South or East or West, but that we were a mighty nation, presenting a solid front to the world, bound to protect the rights, and, if need be, relieve the sufferings of all America. As the result of the war, *Cuba* is free; *Porto Rico* and the *Philippines* have become American possessions, and the United States now boasts "an empire on which the sun never sets." She begins the twentieth century the leading power of the world in industry, finance, and diplomacy.

In 1800, the United States was the only republic in the New World, and her area comprised less than 5 per cent. of the area of the

American Continent. In 1901, there were eleven republics on American soil, occupying 75.8 per cent. of the Continent. More than this, the American Revolution inspired the French Revolution and paved the way for the constitutional monarchies of Europe. When the application of the democratic principle in government had brought the people together, those of kindred blood naturally sought to join themselves under a common rule, and we have as a result the French Republic, the German Empire, and the Kingdom of Italy. In addition to this, *Japan* has taken her place along with the nations of the west; *Russia* is gradually approaching a constitutional government, and *China* is beginning to open her doors to the influences of a new civilization.

GEOGRAPHICAL EXPLORATION AND COLONIZATION.

At the close of the eighteenth century our knowledge of the topography of the earth was confined to one continent, comprising about one-tenth of the area of the globe. Europe was the only grand division containing no great unexplored regions. The interior of America had been partially opened up by the *Jesuit* missionaries, but only the narrow strip occupied by the thirteen original states was well known. A geography published in *Philadelphia* in 1795 states that "no mountains of considerable size were known except those around the pole and the long ridge which runs through the American states," and maps published as late as 1850 describe the region west of the *Mississippi* as the "Great American Desert." The greater part of British America remained unexplored until the last half of the century. The vast interior of *Asia*, including a large portion of the Chinese Empire, *Turkistan*, and the region about *Pamir*, had not been trodden by the foot of a European, and the ports of *Japan* were closed to foreign traffic.

Scarcely anything was known of *Australia*, and *Africa*, although her coasts had been skirted by European ships for three hundred years, was to all the world a great unknown land. The polar regions had not been visited, and the ideas concerning them were almost wholly imaginative.

The nineteenth century has been the century of geographical exploration and discovery. The winding passages of the Arctic Archipelago have been traversed by the navigators of England, America, *Scandinavia* and Russia. The most successful of these have penetrated to within less than four degrees of the pole, and sufficient has been learned of the north polar regions to disprove the theory of an open polar sea, and to give geographers such knowledge of this part of the world as to make further exploration more a matter of adventure than a search for needed geographical information. *South polar expeditions* during the last half of the century have also been fruitful of some results. The south magnetic pole has been discovered, and the outline of a supposed Antarctic continent has been partially traced; but a large region in this part of the world is still unexplored.

England and Russia have vied with each other in their explorations of the interior of Asia, the Russian from the north and the Englishman from the south. The vast plateaus of the interior have been opened up to the influences of civilization; the *Himalayas* have been scaled, and the altitude of the loftiest peaks has been determined; both Indies have been thoroughly explored by the English and placed under the influences of their system of government; the interior of China has been traversed by men of all nations, and Australia has become a great commonwealth, whose resources are known throughout the world.

The most extensive explorations of the cen-

tury were those carried on in Africa from 1860 to 1900. By means of the efforts of such men as *Livingstone*, *Cameron*, *Speke*, *Mungo Park* and *Stanley*, the interior of this great continent, a third larger than North America, has been revealed to the world. In 1800 the sources of the *Nile* were unknown; the great lakes in the interior had never been seen by civilized men; the *Niger* had not been explored, and nothing was known of the *Congo* beyond the rapids near its mouth. The twentieth century begins with nearly all of the continent explored, leaving only a portion of the Congo Basin for future study. Several nations have contributed to this work, but England has been the leader. France and Germany have contributed their part, and *Belgium* has taken special interest in the equatorial regions.

Such was the activity of the geographers of nineteenth century that they have left little in the way of study of the physical features of the earth for future explorers. Excepting the regions already named, the area around the south pole and a portion of the Congo Basin, the surface of the earth has been revealed to civilization.

COLONIZATION.—The century has witnessed remarkable changes in colonial possessions. At its beginning, Spain held all of South America except *Brazil*, *Mexico*, and Florida, and, if we include Louisiana, all of the United States west of the Mississippi. She also owned Cuba, Porto Rico, the Philippines, and several other groups of small islands. She began the century with the most extensive colonial possessions of any nation; she ended it without a colony of importance. Within a period of ten years, from 1815 to 1825, Spanish rule was overthrown in South America and independent republics were established. Those sections which now form a part of the United States were sold, and in 1898 the conditions in Cuba

led this country to interfere in her behalf. By the Spanish-American War, Cuba, Porto Rico, and the Philippines were lost.

England began the century with about the same extent of empire that she had at its close, excepting the territory acquired in Africa. The century has witnessed great advancement in government and general prosperity in all the British colonies.

Napoleon's conquest of *Egypt* was the first attempt of modern times to gain territory in Africa. This was followed by the acquisition of *Algiers* by France between 1830 and 1848; and since the establishment of the last republic, France has continued to increase her African territory until in 1900 she held larger possessions on that continent than any other nation. She also has valuable possessions in *Tonquin*.

The German Empire was formed so late in the century that colonization was not attempted until the other nations were well under way in extension of their holdings. German East Africa, the Kamerun country, and German West Africa and several islands in the South Pacific have, however, been acquired.

The United States begins the twentieth century with her first colonial possessions. By the fortunes of the Spanish-American War, Porto Rico and the Philippines came under her control. The *Hawaiian Islands* were annexed by resolution of Congress. One of the *Samoan Islands* was acquired by treaty, and just as the new century begins, she has purchased the Danish West Indies. Her colonial policy remains to be determined.

SCIENCE.

The scientific spirit has been one of the greatest influences which will characterize the nineteenth century, and because of it the century will always stand as the great interpretative period of nature and of the past ages. It is to the application of the scientific

method of research that we owe the advancement in our knowledge of natural law, and from this increased knowledge came the manifold discoveries and inventions which have changed the face of the earth. Of all the results of thought during the century, the discovery and establishment of the doctrines of evolution and the conservation of energy must ever be considered the greatest. The application of Darwin's Theory to the various departments of nature has led to the discovery of many laws, and the application of the theory of conservation of energy to these laws has given many important results in the industrial world.

A few of the many branches of natural science deserving of special notice on account of their relation to these great general truths are:

ASTRONOMY.—While *astronomy* is the oldest science, and was well established even before the nineteenth century, yet the past hundred years have seen a new astronomy spring forth and replace the old. The most marked progress in astronomy during the century has been along the following lines:

(1) Building and equipment of *observatories*. At the beginning of the century there was not a single observatory in the United States or the southern hemisphere. In 1900 there were over 200 observatories. Fourteen of these were south of the equator, and forty-seven of them in the United States. Among those in our country the observatory at *Harvard*, the National Observatory at *Washington*, the Lick Observatory in California, and that connected with the *University of Chicago*, located at Lake Geneva, Wis., can be named as the largest, best equipped, and most active observatories in the world.

(2) The perfection of the *telescope*. A hundred years ago refractory telescopes were little better than the ordinary spy-glass of to-day.

From this small beginning the telescope reached the degree of perfection seen in such magnificent instruments as that of the Lick Observatory with an object glass 36 inches in diameter, and the *Yerkes telescope* at Lake Geneva with a 42-inch objective, and a tube having a focal length of 70 feet.

(3) The application of the *spectroscope* to the study of the sun and stars. By means of this instrument the physical state and chemical composition of many of the heavenly bodies have been determined.

(4) The application of *photography* to astronomy. By the use of the art of photography many stars, nebulae and comets, whose existence was not before known, have been discovered and located.

(5) The systematic study of the heavens by the united action of astronomers, resulting in a complete mapping of all the known stars. Many other special lines of investigation have also been carried on, such as the study of sun spots and their relation to atmospheric phenomena, the discovery of minor planets and binary stars, and the study of the motions and velocity of stars.

CHEMISTRY.—At the beginning of the century the science of *chemistry* had been in a formative condition. *Priestly* had discovered *oxygen*, and a few general principles of chemistry were recognized, but the great laws of the science were unknown.

(1) Chemical theories and laws. The first great step in advance was the publication by John Dalton of his *Atomic Theory* and laws of combining proportions, in 1807. This laid the foundation of modern chemistry. The study of Dalton's theory has led to the discovery of many other laws, such as Gay-Lussac's law of combining volumes and *Avogadro's law*. Later *Sir Humphrey Davy* developed the idea of the dualistic nature of compounds, which has proven of great assistance in the study and the

classification of compounds. All these theories constitute a basis for the principles of chemical analysis.

(2) Elements. There were only 30 known *elements* at the beginning of the century. Now about 80 are recognized as the result of present methods of chemical analysis.

(3) Industrial application. Volumes might be written upon this division of the subject, but only the most important results can be noticed. These are: (1) The discovery of the various coal-tar products so extensively used in the arts. (2) The application of chemistry to the processes of extracting metals from their ores, whereby ores formerly considered worthless were made valuable, and the formerly rare metal *aluminum* has been brought into common use. (3) The manufacture of alkalies and chlorides, such as soda, potash and chloride of lime on a vast scale. (4) The *Bessemer* process of the manufacture of steel.

MEDICINE AND SURGERY.

The advancement in all departments of medical science during the nineteenth century exceeds that of the previous two thousand years. This progress has been largely due to the advancement in kindred sciences, the perfection of the *microscope*, improved methods of investigation and diagnosis, and to experimental work in *laboratories*. While advancement in medical science has been general, yet in certain departments it has been more marked than in others. These are:

(1) THE EDUCATION OF PHYSICIANS.—Great progress has been made in both the methods of education and in the kind and degree of preparation required for the practice of medicine in all enlightened countries. At the beginning of the century, there were only three medical schools in the United States. These were connected with the *University of Pennsylvania* and *Dartmouth* and *Yale* Colleges, respectively. The

last report of the Commissioner of Education shows that there are now 155 medical schools in the country. A large number of these stand in the front rank, and are equipped with the best of modern facilities. At the beginning of the century, the instruction in medical schools was crude, narrow and limited; and it is only within the last twenty-five years that great advancement has been made in the training of physicians. Medical schools are now placed on the same footing as the departments of every well-regulated university; *hospitals* and laboratories are provided; and in most states and countries wise laws have made provision for procuring subjects needed for dissection. In addition to this, many schools contain departments of high order for the study of special lines of medicine and surgery. The establishment of such schools has developed trained specialists who are able to accomplish in their respective lines what the general practitioner frequently dare not even attempt.

Along with this demand for a better education has also come the growth of medical libraries, and by the close of the century, the United States could boast in the library of the Surgeon General of the United States Army at Washington the foremost medical library in the world.

(2) THE USE OF ANÆSTHETICS.—The first surgical operation in which *ether* was used as an anæsthetic was performed by Dr. John C. Warren in the Massachusetts general hospital in 1846. *Chloroform* was brought into use for the same purpose in England the year following. The production of anæsthesia is justly considered one of the greatest discoveries of the century. Its influence on surgery is readily seen from the fact that during the five years preceding the discovery only 184 operations had been performed in the Massachusetts General Hospital. During 1900 over 3,700 operations were performed in the same institution. Through

the use of anæsthetics the surgeon's knife is robbed of most of its terrors, and operations which were before impossible can now be performed with ease and safety. Dr. *Oliver Wendell Holmes* in one of his medical lectures states the value of this discovery in the following beautiful language: "The fiercest extremity of suffering has been steeped in the waters of forgetfulness, and the deepest furrow in the knotted brow of agony has been smoothed forever."

(3) ANTISEPSIS. The next great advancement in surgery was in the application of *antiseptics* in all operations. Anæsthesia did not relieve surgical operations from most of the dangers which followed. Suppuration, fever, *gangrene*, and lock-jaw were frequent occurrences whenever major operations were performed, and the mortality resulting from these causes was very great. Now, thanks to the efforts of the English surgeons, *Lister* and *Warren*, these dangers are removed and even the most difficult operations are attended by only a small percentage of mortality. The marked effect of antiseptics has been well illustrated in the results during the recent wars. But few American soldiers have perished from gun-shot wounds through the Spanish-American War or in the Philippines, and the same may be said in regard to the British soldiers in the recent South African War, while the percentage of mortality among wounded soldiers during our Civil War was very great. This difference is accounted for in the fact that the soldiers during the Civil War did not have the benefit of antiseptics.

(4) PREVENTION OF DISEASES.—*Vaccination* was a discovery of the eighteenth century, and was the first step in a series of discoveries and measures for preventing the spread of contagious diseases. During the nineteenth century and especially during the last quarter of that century, great progress has been made in

teaching people practical methods of sanitation, of controlling contagious diseases, and in enforcing strong sanitary regulations in towns and cities. The development of *bacteriology* and the application of this science in the practice of medicine by *Pasteur*, *Koch* and others has greatly reduced the rate of mortality in such diseases as *diphtheria*, *cholera*, and *typhoid fever*.

In addition to the advancement made along these lines, the general practice of physicians has been revolutionized. Disease is now treated in a scientific manner, the quality of medicines has been improved, and the quantity administered is greatly reduced. Statistics show that as the result of all these measures the average of human life has been perceptibly lengthened during the century.

ELECTRICITY.

It has been claimed that men knew as much about what *electricity* is at the beginning of the century as they did at its close. However this may be, at the beginning of the twentieth century men know vastly more of the relations of electricity and its application to science and industry than ever before. At the beginning of the century, electricity was considered the toy of scientific men. *Franklin's* invention of the lightning-rod was the only attempt that had been made to apply the knowledge of its laws to any practical purpose. From that small beginning the use of electricity has increased until this force has become one of the most important agencies in industrial and commercial life.

(1) THE GALVANIC BATTERY.—The first great discovery leading to the practical use of electricity was that of the pile or battery by *Volta* in 1799 or 1800. This battery afforded the first means of obtaining a steady electric current. In 1802 Sir Humphrey Davy applied the galvanic

battery to the production of the electric arch, and showed that by means of a powerful battery a light of dazzling splendor could be obtained. This was the forerunner of the *electric light* of the present day. Davy also discovered that a strong current from this battery would separate compounds of certain alkaline metals. By this means he discovered *sodium* and *potassium*, and in so doing laid the foundation for the electro-chemical work of the future.

(2) ELECTRO-MAGNETISM.—At the beginning of the century the knowledge of *magnetism* was confined to the action of the lodestone and the magnetic needle. The relation of magnetism to electricity was entirely unknown until near the close of the first quarter of the century. The discovery of *electro-magnetism* and of the laws governing electro-magnetic currents was the beginning which led to the application of electricity to the industrial arts. In 1826 Prof. *Joseph Henry* of the United States began a series of electrical experiments which led to great practical results. He made the first electro-magnet of soft iron that was of practical use. This was the first step leading to the invention of the *telegraph* by Prof. *Morse*, and later to the *telephone* by *Alexander Graham Bell*. The first line of telegraph was built in 1844 and extended between *Baltimore* and *Washington*. *Wheatstone*, *Sterne*, and others were working upon the same idea in Europe, and in a few years from the erection of this line, the electric telegraph was in common use in all the large cities in Europe and America.

In 1858 the first *Atlantic cable* was laid. Its completion was signalized by special celebrations in England and the United States. Though this cable was at first unsuccessful, it was afterwards perfected and brought into use. Others followed until now telegraph cables join all the leading countries of the world. Measured by their means of communication, *Chicago* and *Peking* are to-day nearer

each other than were *Boston* and *New York* before the use of the telegraph.

The telephone was first exhibited to a few scientists at the *Centennial Exposition* in Philadelphia in 1876. The telephone was in the beginning applicable to short distances only, but it was gradually perfected and improved until it can now transmit the human voice over a distance of more than 1,500 miles. The close of the century saw over three-fourths of a million telephones in use in the United States alone, employing more than one-half million miles of wire. These inventions, the telegraph and the telephone, have revolutionized commerce and made the operation and extension of our great railway systems possible. They are breaking down international barriers by doing away with national prejudice, and are fast leading the world to recognize the brotherhood of man.

(3) **ELECTRIC LIGHT.**—Electric lighting is a product of the last quarter century. At the Centennial Exposition two exhibits of electric lighting apparatus were made, but neither system had been brought to the degree of perfection which would admit of its practical use. During the next three years more progress was made, however, and at the *Paris Exposition* in 1878 the Avenue de l'Opera was lighted by electricity. From that time the use of electric light began to extend. *Edison* and others perfected the incandescent lamp, and electric lights now cheer the home in nearly all towns and hamlets.

(4) **ELECTRIC MOTORS.**—The dynamo, which made the electric light practicable, originally led to the invention of the electric motor. In 1850 the electric motor was unknown, and twenty years before the end of the century it was a curiosity; but from 1880 to 1900 electricity made rapid progress in replacing steam as a motive power in factories and on street railways. In a few instances it has even replaced the ordinary locomotive for special

purposes on some of the large railway systems of the country. This application of electricity during the last decade of the century was so rapid and the changes wrought by it were so important that only its leading effects can be named. Among these are the use of water power, before unavailable on account of its location; the direct application of power to machines, which thus did away with the ponderous engines and complicated systems of shafting, pulleys and belts formerly necessary to every machine shop, and the making possible of the location of countless small factories in the country, where they would be free from the dirt and unsanitary conditions often connected with the large manufacturing establishments of the city.

Progress in the electrical science has been due to the progress in other sciences, and in many instances to the perfection of machinery. It is gratifying to every citizen of the United States to know that by far the greatest part of this progress is due to American industry and ingenuity. Our country enters the twentieth century leading the world in the application of electricity to the arts, and her electrical inventions are rapidly displacing those of other nations in every country of the world.

TRANSPORTATION.

The two great inventions which, during the century, revolutionized the world's transportation are to be accredited to an American and an Englishman: *Robert Fulton*, the inventor of the steamboat, and *George Stephenson*, the inventor of the railway locomotive. At the beginning of the century, transportation by steam power was unknown, and but few even dreamed that it might become possible. In 1807 Fulton sent his *Clermont* up the *Hudson*, astonishing all beholders. This began the revolution in transportation by water. The effect of the application of steam

power to navigation cannot be realized by one living at the beginning of the twentieth century, for such progress was made during the last quarter of the nineteenth that the conditions previous to the introduction of steam can only be imagined. At first it was argued that steamships could never be used for crossing the ocean, but the first ship crossed the Atlantic by the combined aid of sails and steam power in 1819, and in 1833 a ship made the voyage by the use of steam alone. The application of steam power to ocean ships was assured.

Development for the next twenty-five years was slow but continuous. While the best steamships of 1850 would be deemed wholly impracticable at the present day, they were nevertheless a great improvement over the sailing vessels in use before their time. From 1850 to 1900 was a period of great advancement. The substitution of steel for wood in the construction of ships was almost as important a change as the introduction of the *steam engine*. Steamships have continued to increase in size and strength; engines have been enlarged and greatly improved until now the quadruple expansion engine requires only 1.45 pounds of coal per indicated horse power per hour. The screw propeller has almost entirely replaced the paddle wheel, giving greater speed and a more uniform motion. The introduction of signals, search lights, and other devices has so diminished the dangers of collision that a journey upon the sea is attended with as little risk as one upon land.

The following comparisons show the potent results which these improvements in navigation have secured: The tonnage in 1800 was entirely sail; in 1900 it was 70 per cent steam. In 1800 the trade between the United States and England comprised 1,054 voyages; in 1899 there were 6,060 voyages between these countries. The first iron steamship built in 1843

was of 2,984 gross tons; in 1900 there were 980 ocean steamships, each having more than 4,000 gross tons. These ships carry nearly one-fourth of the world's ocean trade. The largest ship constructed in 1900 was the "*Deutschland*" which has 15,500 gross tons, and a speed of 23.36 knots per hour. In 1838 a passage from *New York* to *Bristol* cost \$150; now the same trip can be taken with much greater comfort for \$30. In 1868 the freight on wheat from *New York* to *Liverpool* was \$5.75 per ton; at the close of the century it had been reduced to \$1.90 per ton.

The increase in the size of ships and the volume of commerce has required an equal improvement in wharf facilities. *Docks* have been enlarged, harbors deepened, elevators erected, and devices for loading and unloading in the shortest possible time have been invented. These developments have placed the construction of ships beyond the means of any individual, and the shipbuilder of the first half of the century has given way to the great *corporation* with its accumulation of capital equal to the demands of the times. The development of navigation has also made possible the construction of the *Suez Canal* and other great ship canals of the world. England began the century as the leading nation upon the sea, and she still retains her position, with Germany second in line. The United States does not take high rank in the merchant marine of the world.

RAILWAYS.—While the *railroad* has been in use since the days of the *Romans*, it was just at the close of the first quarter of the nineteenth century that the locomotive was invented. The construction of railways proceeded so rapidly that within the seventy years following Stephenson's invention there were 466,000 miles of railway in the world, 190,000 of which were in the United States.

The first steam locomotive was used on the

Stockton & Darlington Railway in England in 1825. The first attempt to use the locomotive on a large scale was in 1830, when it was employed for general traffic on the Liverpool & Manchester Railway. From England the locomotive soon found its way into the most progressive countries of the continent. The United States quickly followed the example of England, and steam power was employed on the Baltimore & Ohio Railway in 1829. The next year the first American locomotive was built. Although the application of steam power to railways originated in England, it developed more rapidly in the United States than in any other country. From 1830 to 1850, 7,000 miles of railway were constructed, and during the last half of the century over 180,000 miles of track were laid.

Until within recent years the road beds of American railways were far inferior to those of England, and the speed of trains was consequently slow. But the last quarter century has seen all this changed; grades have been reduced, road beds have been made more solid, bridges have been strengthened, and heavy steel rails have replaced the iron rail of former years. American patterns of cars and locomotives have always been superior to those of foreign make, and the improvement in railway equipment has kept pace with the demands of the century. The first locomotive built by the Baldwin Works was rated to haul thirty tons on a level track; in 1885 this same company put out locomotives that would haul 3,600 tons on a level track, and later the capacity was increased to 4,000 tons. The carrying capacity of cars has also been increased proportionately, until now freight cars of 40,000, 50,000, 60,000, and even 100,000 pounds capacity are found on all the great lines of railway. The improvement in the passenger service has been equally great. The first passenger coaches were smaller than the smallest

street car of to-day. While these were gradually improved in size and equipment, it was not until after 1870 that a long journey could be taken with comfort. To *George M. Pullman* the traveling public owes much of the luxury of modern travel, for to him is due the invention of the sleeping car, the parlor car and the dining car. By means of these a journey from New York to *San Francisco* can be taken without discomfort, and the traveler can fare as sumptuously as in the best hotel.

The speed of railway trains has been greatly increased. The first locomotive could run at the rate of six miles an hour, and a few years after the opening of the Baltimore & Ohio Railway they boasted of locomotives having a speed of fifteen miles per hour. Even as late as 1888 there were but few trains in the United States having a schedule of more than forty miles an hour. Now long runs on a schedule rating fifty and fifty-five miles an hour are common on the best roads.

These improvements have led to great reduction in the expense of operating railways and a consequent reduction in charges for transportation. The rates of freight in the United States have been gradually lowered from more than three cents per ton per mile at the close of the Civil War to less than three-fourths of a cent at the close of the century. Proportionate reductions have also been made in passenger tariffs.

Directly underlying the construction and equipment of railroads is the advancement in methods of operation. The first roads were short lines, each owned by separate companies. Transportation for a long distance required many changes, which, in the matter of freight, greatly increased the expense. A change in these conditions was inaugurated when the half dozen or more roads now constituting the New York Central were united under one management. Larger combinations

have been made since, until at the close of the century the leading railways were united into great trunk lines, each constituting a system under one management. This arrangement has greatly simplified methods and expense of operation, and has so reduced the cost of transportation as to bring the use of the railroad within the reach of all classes of people and lines of industry.

The first railway lines connected large centers of population. Later they were built to join smaller towns, and finally the railway became the pioneer of civilization. The great trans-continental lines have been the means of developing and settling most of that portion of the United States west of the Mississippi, and what these roads have done for our country the *Trans-Siberian Line*, just about completed at the close of the century, will do for Asiatic Russia, and the *Cape-to-Cairo Railway*, already begun, is destined to accomplish for the vast interior of Africa.

SOCIETY.

In all civilized countries the nineteenth century has witnessed remarkable progress in the activities of social life. The evolution of these great social movements has been gradual, and each has been the result of the working together of several or many causes, and has also been for the betterment of the individual and the community. The setting forth of various theories of society by Comte, Ward, Giddings, Patten, and others; the strong advocacy of *Socialism* in France, [Germany and England; and the practical reforms which modern industrial and commercial conditions have made necessary are the great causes of this social evolution. While the most important of these movements are discussed under separate heads, the reader needs always to keep in mind that none can be considered separate from the others. For as the life of

the individual is identified with all the activities that it touches, so the life of society is the combined result of all the conditions and movements of a given period.

GROWTH OF THE DEMOCRATIC SPIRIT.—If any one of the social movements of the century can be considered as more fundamental than the others it is the development of the democratic spirit. It broke down class distinctions, secured representative government, and established the doctrine of equality among men. The first important event of the century tending to this end was the passage of the Reform Bill in England in 1832. By this measure the *franchise* was extended and the House of Commons made a more truly representative body. The revolution in France and Germany in 1848 was only an extension to these countries of the principles of the Reform Bill, and led to similar results, though in different ways. As the doctrine of equality became generally accepted by society the idea of vassalage became repugnant, and the wage system gradually replaced the old relation of master and servant, which was a relic of feudalism.

Later the same idea extended to serfdom and slavery, and during the century millions of slaves in the United States, the British colonies, and Russia were given their freedom, while provision was made in other countries for the gradual manumission of many more.

The development of the democratic spirit led to an increased demand for various products, as the different classes of society became better acquainted with each other. Out of this acquaintance combined with the increased facilities for communication and transportation has been built the wonder of modern times, the great industrial fabric of the century. The development of industries naturally called for a union of forces, and we have as the result the combination of capital into great corporations on one hand, and the

union of craftsmen into guilds or labor unions on the other. While this application of organization and system to the conduct of the great industries of the world has not been wholly free from injurious effects, it has, on the whole, increased the rate of wages and so cheapened products that many of the pleasures and comforts of life, which even a quarter of a century ago were luxuries to those having good incomes, are now within the reach of all classes. Moreover, the democratic idea of equality underlies all the great movements for bettering the conditions of mankind. It is the moving spirit which prompted the reforms described below.

LAW.—Civil law is the outgrowth of altruism applied to the affairs of state. As long as the French king could say with impunity, "I am the state," the laws of his realm were based upon his wishes concerning the relations between himself and his subjects. When government became representative, however, the application of law was broadened to include the rights of the citizens. That the reign of law, even in the most enlightened countries, was not complete at the close of the century the most ardent optimist must admit; but that well-organized systems of jurisprudence exist in all civilized countries, and that under these systems justice is much more easily and quickly secured by all classes than formerly, is evident to all students of history. During the century two continents, North America and Australia, have yielded to the conquest of English law, and the same benign system of jurisprudence has also been extended to the millions of India, Egypt, and South Africa.

Legal relations have been made more definite by such modifications of laws and systems as have narrowed the functions of the judiciary and transferred to written law much of what at the beginning of the century was a mere matter of judicial opinion. This change

has deprived the courts of equity of their former prestige, and is doubtless the cause of their being combined in many states with courts of law.

The third great advance in law is its extension to the affairs of women. At the beginning of the century woman had practically no legal rights; at its close her rights were in most cases equal to those of man. As this topic properly belongs to another division of the subject, it is treated more in detail under the Status of Women.

The fourth change worthy of mention is the sweeping away of the last traces of the feudal system of land tenure in the United States, and curtailing it in England to the law of primogeniture. The same idea that brought about the abolition of the ancient land tenure also instituted laws regulating the relations between employer and employe, and securing to the latter fair wages and civil treatment.

Finally, there has been a great change for the better in the administration of law. The changes in legal procedure wrought in the last century by consolidating tribunals of equal rank and simplifying and cheapening methods of procedure have been of the greatest importance. By these changes legal processes have been thrown open to the light of public inspection, and common justice has been assured to all.

EDUCATION.—The American and French revolutions showed the nations participating in them that the stability of representative governments must rest upon the intelligence of their citizens, and these great movements in the interest of free government called attention to popular education with a force never before equaled. The first years of the century were opportune for the development of systems of public instruction, and were productive of good results. During these years the theories of modern primary instruction

were established by *Pestalozzi* and *Froebel*. To the former we are indebted for the principles underlying our modern methods in primary education, and to the latter for founding the *kindergarten* and the introduction of women as teachers of children. During the last half century elementary schools received a great impetus in nearly all civilized countries, but their progress has been most marked in Germany, France, England and the United States.

At the close of the century the public schools of Germany led the world in point of systematic management, the employment of thoroughly trained teachers and in general efficiency. Education is wholly under the control of the state, and attendance upon the public schools is compulsory for all children between the ages of seven and fourteen. The interest in public education in France dates from the revolution in 1789, but under the rule of Napoleon the elementary schools were neglected, and they were not brought to a good degree of efficiency until after the establishment of the present republic. Popular education was established in England much later than in France and Germany, but the close of the century saw an efficient system of public schools open to all classes. The public schools in the United States date from the settlement of Massachusetts. At the adoption of the constitution the work of public instruction was left to the individual states, and under their care the progress of the common schools has been commensurate with the development of the country. This progress is characterized by the following leading features:

1. The practically uniform classification of all elementary schools into primary, intermediate and grammar grades.

2. The general prevalence in the last decade of the "new education," which develops the physical, intellectual and moral powers of the child.

3. The very general employment of women as teachers in elementary schools of all grades.

4. The perfection of systems in the newer states, whereby the elementary schools are affiliated with the high schools, and these in turn with the state university.

5. The establishment in all states of excellent high schools, open to the public free of tuition.

Higher education has also received much attention. The great universities of Germany, many of which were of long standing at the beginning of the century, have been granted more liberal support; their curriculums have been extended, and at the close of the century students from all lands were receiving the advantages which they afforded. The influence of these universities on the social, political and religious progress of the times has been beyond measure. What is true of the universities of Germany is also true to a greater or less extent of those of the other European countries. *Oxford* and *Cambridge* are too well known to need comment. These and other English universities have exerted a strong influence over English life, and their means of support have been increased as the development of society has broadened the scope of their work.

But in the United States more than in any other country has the growth of higher institutions of learning been phenomenal. In 1801 there were 24 colleges or universities in the country, and only one state, North Carolina, had a state university. The report of the Commissioner of Education at the close of the century recorded 480 institutions of higher education, and the total enrollment in all schools of college grade was, in round numbers, 40,000. In addition to the increase in the number of colleges, two other phases of higher education deserve attention. These are:

1. The development of the great state universities in the newer states.

2. The changes in the courses of study during the last quarter century. The curriculums of all colleges have been greatly broadened; facilities for the study of the natural sciences have been provided; modern languages have been placed on a par with the ancient classics; English has been given attention equal to that of the modern languages, and departments have been added for the study of the great problems of commerce, finance and economics—all of which are so closely connected with our industrial and social life.

The movements for popularizing education and placing opportunities for a more liberal culture before the people are deserving of a place in this review. First in point of time and extent of influence is the *Chautauqua Literary and Scientific Circle*, established by Bishop John H. Vincent in 1874. Following this came the plan of *university extension*, by which several of the leading universities, notably those of *Harvard*, *Pennsylvania* and *Chicago*, through lectures and instruction by correspondence, are conferring educational advantages upon thousands who are unable to attend the higher institutions of learning.

LIBRARIES.—The growth of *libraries* has been nearly commensurate with the growth of education. In 1801 there were in the United States 64 libraries intended for popular use, and containing in all less than 50,000 volumes; in 1900 there were over 10,000 libraries, having over 40,000,000 volumes, while the library records for the year show a circulation of over 50,000,000 volumes. The first libraries open to popular use were connected with colleges. Following these came the public library of the town, supported by a general tax. In 1835 New York enacted a law which permitted school districts to levy a tax for school libraries. Three years later this measure was supplemented by a state appropriation to aid the districts. This was the beginning of a movement

which during the last two decades became very general, and which has done more than any other single agency to place good literature at the disposal of all classes of society; and just as the new century begins, Mr. Andrew Carnegie, by his numerous donations to aid libraries, has given a great stimulus to the library movement. The Library of Congress, established in 1800, has now the largest collection of books and manuscripts in the western hemisphere, one of the largest half-dozen in the world. It comprises at present over 1,000,000 books and pamphlets, almost 100,000 manuscripts, more than 60,000 maps and charts, 300,000 pieces of music and 100,000 prints. Besides its direct service to readers, the library is doing a great educational work through its freely distributed publications.

THE STATUS OF WOMEN.—The nineteenth century has been called "the woman's century." The greatest progress has been made by women in education, in the acquiring of legal rights, and in privileges of industrial and professional life.

During the first two centuries of our colonial and national life but little attention was given to the education of women. In the country schools the girls had equal opportunities with the boys, but they were either wholly excluded from the grammar schools or were admitted under such restrictions as deprived them of some of the best advantages which these schools afforded. In 1804 there were only three endowed institutions for the higher education of women in the United States. But at the close of the century, of the 480 colleges reported by the Commissioner of Education, 336 were open to women. The agitation in favor of higher education for women so auspiciously begun in the United States has borne fruit in other lands; the great universities of Germany, England, and in fact of all the countries of Europe are now open to women. In addition to

this, opportunities for liberal education are being extended to the women of India, China, and Japan. Throughout the civilized world in 1900 the opportunities for the education of women were nearly on a par with those for men. The constantly increasing number of women graduating from colleges and universities shows that these advantages are appreciated and improved.

At the beginning of the century woman had practically no rights before the law. "Mothers did not own their children, nor the garments which they wore; any money that a married woman could earn or inherit became the property of her husband and could be taken to pay his debts." The growth of public sentiment which has brought about the advancement of woman's condition was very slow, and the most important changes have taken place since the Civil War. The great leaders of the anti-slavery movements became the strongest advocates of equal rights for women. As a result of this agitation, in all states just and equitable laws now secure to married women the right to hold property, the guardianship of their children, and the power to make wills, and in many states laws exist conferring upon married women the right to make contracts and to engage in business. The property and business rights of unmarried women are the same as those of men. In many states partial suffrage has been conferred upon women, and in three—Colorado, Idaho, and Wyoming—women have equal voting privileges with men.

The advancement of women in industrial and professional life has constituted one of the greatest social revolutions of the last half century. In 1800 only unmarried women over age and widows could legally collect their own wages or control their own property, and this right was greatly restricted by popular opinion. Even as late as 1840 there were only

seven occupations open to women in the United States. These were: teaching, needle work, keeping boarders, working in cotton factories, type setting, book binding, and domestic service. The dictum of society compelled most women to eat the bread of dependence. The lack of opportunity for liberal education prevented their fitting for higher positions, and the idea of their general incompetency kept them from a just recognition of the qualifications they possessed. Their pay was very meagre; a dollar a week and board, which was obtained by living a week each with the families of the district, was considered good wages for a woman teacher. At the close of the century, there were at least 400 occupations open to women, and these included nearly all the departments of educational, industrial, and professional life. This remarkable social and industrial revolution has been wrought gradually, and is dependent upon the great industrial changes caused by the introduction of labor-saving machinery, and a consequent specialization in all lines of manufacture; upon the recognition of equal rights for women; upon increased facilities of communication; upon greater opportunities for education; upon organizations for the benefit of women, particularly the women's clubs; and more than all else, upon the intellectual vigor and laudable ambition pervading American womanhood during the last half century.

LITERATURE.

"Literature is the mirror of life." It reflects the thought, feelings, industrial, political, and social trend of its time. To draw any sharp lines of demarkation between the literature of the eighteenth and that of the nineteenth century is impossible, for most of what bore fruit in the first half of the latter was well begun in the former century. The great industrial and social movements of the century multiplied

relations and made life more complex than formerly. The inevitable result of the democratic idea was a growth of interest in the individual, while the growth of the scientific spirit led to a universal demand for truth. Science called for facts, not fancies. The influence of these ideas pervaded and dominated the literature of the greater portion of the nineteenth century. While the advancement made in the *literature of Germany, France, the Scandinavia*, and other countries of Europe is in many respects equal to that of English and American literature, the limits of this article make it necessary to confine our review to that of the English speaking countries.

ENGLISH LITERATURE.—At the close of the eighteenth and during the first years of the nineteenth century, there was a great revival of Romanticism and a return to nature in literature; there was also a new recognition of the inherent worth of the individual rights of man, and a revolt against tyrannical government. The greatest result in literature of this interest in the individual was shown in the growth of fiction. *Jane Austen* in the first quarter of the century depicted English domestic life in its reality, and *Sir Walter Scott* soon after introduced the historical novel. While Scott's novels dealt with the past and were not representative of the spirit of his times, yet on account of the field which they occupied and of their influence on the writers who followed, they marked the beginning of a new era in literature. The historical novel paved the way for the novel with a purpose—such as are strongly exemplified in some of the works of *Dickens* and *George Eliot*. The works of other writers, notably *Thackeray*, *Lever*, and *Trollope*, exemplify the novel of manners, while still others, particularly those of *Charles Kingsley*, discussed the social problems of their time. Nearly all these classes of fiction are characterized by a systematic analysis and

synthesis of human character. While some of the writers, especially *Dickens*, represent the grotesque in caricature, most of them depict to the best of their ability life as they find it. In the fiction of this period, the Romanticism of the past century was replaced by a realism and individualism so strong as to exert a marked influence upon society. These features, however, never too attractive, became so prominent that there was a reaction during the last decade of the century; the historical novel began to replace the novel with a problem, and in the work of such writers as *Robert Louis Stevenson* and *Anthony Hope*, we find a return to the Romanticism of the previous century.

Prevalence of the scientific spirit is not conducive to the production of poetry. By the scientist and the reformer the poet is considered as a mere dreamer whose work is of little or no particular value. That the English poetry of the nineteenth century does not equal either in volume or rank that of the Elizabethan Period is perfectly natural. Nevertheless, there is much that has been influential in molding certain phases of life, and of such value that it is destined to endure. In the early years, the "Lake Poets," *Wordsworth*, *Coleridge*, and *Southey*, were directing thought to the study of nature and the deeper problems of life. In addition to these, during the first half of the century, we find *Scott*, *Byron*, *Shelley*, and *Keats*, many of whose poems are still widely read. The two great writers of English poetry during the last half of the century were *Tennyson* and *Browning*; the former characterized by his great and triumphant faith and charming thought, and the latter by his strong, idealistic, optimistic philosophy. With these should also be mentioned *Dante*, *Macaulay*, *Matthew Arnold*, and *Kipling*.

In addition to fiction and poetry, the century has produced a class of literature peculiarly

its own, i. e., the literature of science. This is exemplified in the writings of *Darwin*, *Herbert Spencer*, *Huxley*, and others. While these writings do not take high rank as literature, in the review of the century they deserve a prominent place on account of their influence on thought. Darwin's "Origin of Species" and Spencer's "Principles of Psychology" considered from this point of view, have undoubtedly been the most influential works of the period.

AMERICAN LITERATURE.—Some critics consider that American literature began with the century, while others give it a much earlier origin. The latter are probably correct. The period really began long before the war for independence, but the literature was of such a character that it was not generally read. When the stress of war was over, and the nation became settled under the Constitution, conditions were more favorable to the development of an imaginative literature. American fiction has, in the main, been marked by the same dominant characteristics as that of England. Realism and individualism were the leading features of the fiction contemporaneous with that of Dickens and that of George Eliot, while the last decade was a return to the historical novel and a marked development of the short story. While the first third of the century produced but few writers, it gave us two—Irving and Cooper—whose names stand foremost among American authors. Irving was the first American whose writings obtained recognition abroad, and Cooper has done for the wild life of early America what Scott did for the lochs and mountains of his native highlands. *Mrs. Stowe's* "Uncle Tom's Cabin" was the first American novel with a purpose. Though from the viewpoint of the literary critic it does not attain high rank, it claims a prominent place among our literature on account of the influence it exerted over a large portion of the country. Most of the fiction

before the Civil War was of a highly sentimental order. In marked contrast to this, however, were the masterpieces of *Hawthorne*, "The Scarlet Letter" and "The House of Seven Gables," which will ever remain among the greatest works of American fiction. From 1870 to the close of the century, the realistic writers, among whom *William Dean Howells* and *Henry James* easily rank first, have been by far the most prominent. The short story under the magic hand of *Breté Harte* was made to occupy a place of prominence, and American humor received a world-wide reputation through the writings of *Mark Twain*.

Poetry at first consisted of the highly sentimental verse commonly found in gift books; but, before the first quarter of the century had passed, *Bryant* was singing of the glories of New England scenery, and had immortalized himself by the publication of "Thanatopsis." The next half century from 1825 to 1875 is the period in which American poetry reached its fullest and highest development. *Poe*, *Longfellow*, *Whittier*, *Lowell*, *Holmes*, *Emerson*, and many other poetic writers of note characterize this period and influence its thought. The last quarter of the century, however, produced no poet of great merit. The century was prolific in its production of history in both England and America. In the former, *Macaulay*, *Green*, and *Froude*, with several others appear in works of lasting endurance; while in our own country, *Bancroft*, *Hildreth*, and *Fiske* chronicled the events coincident with the building of the nation. *Prescott* in his charming works on early Spanish and Indian life in Mexico and Peru, and *Parkman* for his unique and interesting exposition of the French phase of American history, should also be remembered.

Of essayists each country had a full share, chief among whom are *Lamb*, *De Quincy*, *Carlyle*, and *Macaulay* in England, and *Emerson*,

Lowell, and *Whipple* in the United States. To the above list many others might be added were our review more extended. The growth of periodicals during the last quarter century has made the essay a leading feature of our Literature and also given it a standing and influence never before accorded.

As a whole, the literature of the century is characterized by the prevalence of individualism in fiction; introduction of a large class of writings upon scientific subjects; and, during the last quarter, a general improvement in style and the consequent prevalence of mediocrity.

RELIGION.

The nineteenth century inherited the skepticism and turbulence consequent upon the political and social disturbances which characterized the closing years of its predecessor. That a reaction should follow the establishing of the "Age of Reason" and other atheistic tendencies was natural, and this reaction constituted the beginning of the religious growth of the century. The two great branches of the Christian church, the *Catholic* and *Protestant*, have shared in the great religious movements of the century, and in many respects the same phases of development have characterized both; yet this progress is more readily understood by considering each separately.

CATHOLICISM.—The three most important events in the history of the Catholic Church during the century occurred in the last third, and followed closely upon each other. They were the results of the events of the preceding years. They are:

(1) The holding of the Vatican Council in 1869 and 1870. This was the first general council since the Council of Trent in 1542. It numbered between six and seven hundred delegates, the number varying at different periods of its session. The occupation of Rome

by the Italian troops caused an adjournment before its work was completed, but the Council has never been reconvened.

(2) The second event of importance was the adoption of the constitution by the Vatican Council, in which the infallibility of the Pope was declared.

(3) The third event was the abolition of the temporal power of the *Pope*, and occurred in the year in which the Vatican Council was adjourned. This was the direct result of the formation of the United Kingdom of Italy and the occupation of *Rome* by *Humbert II* as his capital.

PROTESTANTISM.—The more important phases of development in the history of Protestantism during the century can, as in the case of Catholicism, be given only a brief summary. They are:

(1) The influence of humanitarianism upon religion, as evinced by the growth of the democratic spirit. The application of this idea to religion made the individual the center of interest and religion became more practical on the one hand, while the interest in man on the other led to the study of history as a source of religious truth.

(2) The reverential subjection of the Scriptures to a critical study. This is generally called the Higher Criticism. By this study the Old Testament has become much better understood, and the fundamental principles of its doctrines are more generally accepted and applied than ever before.

(3) The general recognition of Jesus as a social leader by the Hebrews as well as the Christians. "Christ appears in history as the leader of humanity in the struggle for freedom." In proportion as this truth has been recognized, have movements for the betterment of society been placed on a sure foundation, and the principles of Christianity been the most broadly applied.

(4) Conflict between the dogmas of the church and certain systems of philosophy and the teachings of science. In the first half of the century, Comt  promulgated his doctrine of a humanitarian church, based on what was called Positive Philosophy. Man was recognized as the only deity, and all supernatural influence was rejected. The combination of such influences as those represented by Comt , with the principles of natural science, constituted the most formidable opponent to Christianity during the century. The influence of the doctrine of evolution in unsettling religious belief was very strong, and the followers of church tenets were at first at great disadvantage in the controversy, for they had no well developed system of philosophy with which to meet the arguments of their opponents. This controversy led to the invasion by theologians of the realm of science and philosophy, and the counter invasion of the field of theology by men of science. While much skepticism grew out of this discussion, and several new sects arose, the work of scholars during the closing years of the century showed clearly that no conflict exists between the laws of nature and the revelations of Scripture; and while the controversy was prolonged to be finally settled in the twentieth century, there is every indication of a happy solution of the problem.

There has been during the last quarter of the century a study of comparative religions, which is resulting in the growth of a spirit of tolerance of the different Christian sects towards each other, and of a union of effort for the general betterment of humanity.

MISSIONS.—In the nineteenth century the progress of Christian missions in foreign lands has been steady and the workers have been rewarded with most encouraging results. Special features of the work during the last

fifty years or so have been the establishment of schools and the extensive publication and diffusion of Christian literature in the native tongues and dialects of the people of heathen lands. The murder during 1900 of over 100 missionaries in China was a tragedy which brought up a question—still an open one—as to the right of missionaries to ask government protection.

The history of missions in the Catholic Church is as old as that of the Church itself, and the beginning of the century found their missionaries already in every part of the then known world. It is estimated that the whole army of Catholic workers in foreign fields now reaches over 60,000. In fifty years the Congregation of the Propagation of the Faith, which has the direction of missions in charge, has distributed over \$20,000,000. The most active single missionary body is the *Society of Jesus*, which now has in the foreign field over 3000 priests. A notable event of the century in the history of Oriental missions was the establishment by Leo XIII of a regular hierarchy in India (1886) and in Japan (1891).

To Protestantism the nineteenth century is pre-eminently the century of missions. At the beginning of the century the Church of the Moravian Brethren was the only Protestant denomination actively engaged in missionary work in heathen lands, though William Carey, the first Baptist missionary, had gone to India in 1794. Since that time the growth of Protestant missions has been phenomenal. Their workers are now in every land. The total number of societies engaged in missionary enterprise was in 1900, according to the *Centennial Survey of Foreign Missions*, 558. These societies were represented in the field by about 15,000 missionaries and about 77,000 native preachers, teachers and other helpers.

A
TO
CAUDINE FORKS

A

Aalborg

A, the first letter in almost all alphabets. Most modern languages, as French, Italian, German, have only one sound for *a*, namely, the sound which is heard in *father* pronounced short or long; in English this letter is made to represent seven sounds, as in the words *father*, *mat*, *mate*, *mare*, *many*, *ball*, *what*, besides being used in such digraphs as *ea* in *heat*, *oa* in *boat*. **A**, in music, is the sixth note in the diatonic scale of *C*, and stands when in perfect tune to the latter note in the ratio of $\frac{3}{2}$ to 1. The second string of the violin is tuned to this note.

A 1, a symbol attached to vessels of the highest class in Lloyd's register of shipping, **A** referring to the hull of the vessel, while 1 intimates the sufficiency of the rigging and whole equipment. Iron vessels are classed **A 1** with a numeral prefixed, as 100 **A 1**, 90 **A 1**, the numeral denoting that they are built respectively according to certain specifications.

Aalborg (eel-town), a seaport of Denmark, with considerable trade, shipbuilding, fishing, etc. It is the capital of a province of the same name. Pop. 20,000.

Aali Pasha (1815-1871), a distinguished Turkish statesman, b. at Constantinople. At the early age of fifteen he became a clerk in the foreign office, and rose steadily from one diplomatic post to another, at home, Vienna, and elsewhere, till in 1844 he became ambassador at London. This varied experience left on his acute mind a profound impression of the absolute necessity of extensive reforms in the government of the Ottoman Empire; and with these reforms, under the sultans Abdul Medjid and Abdul Aziz, the name of Aali Pasha is identified. He presided at the Commission which passed the famous reforming decree of 1856, the Hatti-Humayun. At the Congress of Paris he represented the porte, and maintained its cause with zeal and skill. He was grand-vizier more than once; and from 1861 till his death, held alternately with the like-minded Fuad Pasha the most influential posts in the Turkish service. He was active in suppressing the Cretan rebellion in 1867-68, and in repressing Egyptian efforts to shake off the supremacy of the porte.

Aard-vark (Dutch "earth hog") (or Cape Ant-eater), one of the Edentata, and the only ant-eater with teeth. It has seven molars on each side above, and six on each side below; with neither incisors nor canine teeth. It is a stout animal, with long, pig-like snout, tubular mouth, the usual termite-catching tongue, large ears, fleshy tail, and short, bristly hair. The limbs are short and very muscular; on the fore feet are four, on the hind five powerful claws, used in burrowing and in excavating the hills of the white ants on which it feeds. It is nocturnal in its habits, and is very inoffensive and timid. When pursued, it can

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burrow itself out of sight in a few minutes, working inward with such rapidity as to make it almost impossible to dig it out. Its total length is about five feet, of which the tail is 1 ft. 9 in. Its dwelling is a burrow at a little distance from the surface, and thence it may be observed creeping at dusk. Three species are known—one in South Africa, another in Senegal, and a third in South Nubia. The flesh is considered a delicacy.

Aard-wolf ("earth-wolf") (*Proteles Lalandii*), a South African carnivore, belonging to a sub-family of Hyenidae. It is fox-like in size and habit, but has longer ears and a less bushy tail. It resembles a hyena in its sloping back, in its color, markings, and dorsal mane, but has five toes on the fore feet, and the head is much more pointed and civet-like. The back teeth are small and simple, and there is no carnassial or special cutting-tooth. The strong, blunt claws are, as usual, non-retractile. It feeds on carrion, white ants, larvæ, etc., but not on living vertebrates. It is timid and nocturnal in its habits, social but quarrelsome in its life, and tolerably swift in its pace, though usually trusting rather to burrowing than to flight. Like the hyenas, the aard-wolves habitually fight among themselves.

Abancay, a town of Peru, in the department of Cuzco. Sugar, hemp, and silver mining are the principal industries. Pop. 21,000.

Abattoir (slaughterhouse), in general use since the establishment of the celebrated abattoirs of Paris, instituted by Napoleon in 1807, and brought to completion in 1818. The immense packing houses of Chicago, Cincinnati, Kansas City, St. Joseph, and other American cities, represent the largest and best equipped abattoirs in the world. See *Packing*.

Abbey, CLEVELAND (1838-1896), American astronomer and meteorologist; educated in New York and at Ann Arbor; served four years on the U. S. coast survey, studied in Russia, was made director of the Cincinnati Observatory, and in 1871 organized the present weather bureau. The general accuracy of his meteorological predictions obtained for him the familiar name of "Old Probabilities."

Abbot, EZRA (1819-1884), studied at Phillips Exeter academy, graduated at Bowdoin 1840, and in 1856 became assistant librarian at Harvard. He was LL.D. (Yale, 1869). He left his main library of 5,000 volumes to Harvard, the remainder to the Divinity School of the University. His works include *New Discussions of the Trinity*, *Literature of the Doctrine of a Future Life*, and *The Authorship of the Fourth Gospel*.

Abbotsford, the former country seat of Sir Walter Scott, on the south bank of the Tweed, in Roxburghshire, Scotland, in the midst of picturesque scenery, forming an extensive

Abbott

and irregular pile in the Scottish baronial style of architecture.

Ab'bott, JACOB (1803-1879), a popular and prolific American writer, especially of entertaining and instructive books for the young; was teacher and subsequently clergyman.

Abbott, JOHN S. C. (1805-1877), author, was a Congregational minister in Massachusetts. Among the historical works written by him are *The History of Napoleon Bonaparte*, *Napoleon at St. Helena*, *The History of Napoleon III*, and a *History of the Civil War in America*. He was a brother of the above.

Abbott, LYMAN (1835—), clergyman, born in Massachusetts, son of Jacob Abbott, graduated at the university of New York in 1853, and was admitted to the bar in 1856. He took up theology and was ordained in the Congregational Church in 1860. For five years he preached in Terre Haute, Ind. He became pastor of the New England church in New York City, but resigned in 1869. He edited the "Literary Record" of *Harper's Magazine*, and the *Illustrated Christian Weekly*. He was associated with the Rev. Henry Ward Beecher on the *Christian Union*, and afterward became the editor in chief. Mr. Abbott has written a *Life of Henry Ward Beecher* (1883), and has edited Beecher's sermons. In 1889 he became pastor of Plymouth church, Brooklyn, where he remained until 1899.

Abd-el-Ka-der (1807-1873), a famous Arab chief, of a lofty, intrepid, and tenacious character. He distinguished himself by his determined resistance to the French arms in N. Africa. The Turkish power being broken by the French conquest of Algiers (1829), the Arab tribes of Oran made A. their emir, and he was soon at the head of 10,000 cavalry. Two battles, 1833 and 1834, obliged General Desmichels to conclude a treaty with him, and his power was acknowledged in Oran and Titèri. In 1835 he was strong enough to inflict a signal defeat on Gen. Tretzel. But the French gradually obtained the mastery, and in December, 1847, he had himself to surrender. Abd-el-Kader was sent to Toulon, and was liberated by Louis Napoleon in 1852.

Abdica'tion, properly the voluntary, but sometimes also the involuntary resignation of an office or dignity, and more especially that of sovereign power. The more important abdications of the present century are:—

Charles Emmanuel IV of Sardinia,	June 4, 1802.
Charles IV of Spain,	March 19, 1808.
Joseph Bonaparte of Naples,	June 6, 1808.
Gustavus IV of Sweden,	March 29, 1809.
Louis Bonaparte of Holland,	July 2, 1810.
Napoleon of France,	April 14, 1814.
Victor Emmanuel of Sardinia,	June 22, 1815.
Charles X of France,	March 13, 1821.
William I of Holland,	August 2, 1830.
Louis Philippe of France,	October 7, 1840.
Ferdinand of Austria,	February 24, 1848.
Charles Albert of Sardinia,	December 2, 1848.
Isabella II of Spain,	March 23, 1849.
Amadeus I of Spain,	June 25, 1870.
Abdul Aziz of Turkey,	February 11, 1873.
	May 30, 1876.

Abdo'men, in man, the belly, or lower cavity of the trunk, separated from the upper cavity or thorax by the diaphragm and bounded

Abelard

below by the bones of the pelvis. It contains the viscera belonging to the digestive and urinary systems. See *Anatomy*.

Ab'dul-Az'iz, thirty-second Sultan of Turkey, brother to Abdul-Medjid, whom he succeeded in June, 1861. He concluded treaties of commerce with France and England, both of which countries he visited in 1867. Deposed in May, 1876, he committed suicide, or more probably was assassinated, in June, the same year. He was succeeded by his son Murad V.

Ab'dul-Ham'id, thirty-fourth Sultan of Turkey, younger son of Abdul-Medjid, born in 1842, succeeded his brother Murad V, who was deposed on proof of his insanity in 1876. He was a Turk, a Mussulman of the old school, and opposed to European interference. His reign was marked by massacres of Christians in Armenia, and by many internal disturbances. Plate 31, Vol. IV.

Ab'dul-Medjid, thirty-first Sultan of Turkey (1822-1861). He succeeded his father, Mahmud II in 1839. Abdul-Medjid was desirous of carrying out reforms, but most of them remained inoperative, or caused bloody insurrections where attempts were made to carry them out. His reign was marked by the Crimean war, and his resolute conduct in refusing to surrender the refugee Kossuth.

à Becket, THOMAS, born in London 1117 or 1119, assassinated in Canterbury Cathedral Dec. 29, 1170. He was educated at Oxford and Paris and studied civil law at Bologna in Italy, and on his return made Archdeacon of Canterbury and Provost of Beverly. In 1158 Henry II appointed him high-chancellor and preceptor to his son, Prince Henry. At this period he was a complete courtier, conforming in every respect to the humor of the king. He was the king's prime companion, and courted popular applause. In 1162 he was consecrated archbishop, and appeared as a zealous champion of the church against the aggressions of the king, whose policy was to have the clergy in subordination to the civil power. He was forced to assent to the "Constitutions of Clarendon," but a series of bitter conflicts with the king followed, ending in à Becket's flight to France, when he appealed to the pope by whom he was supported. A reconciliation took place in 1170, and Becket returned to England, resumed his office, and renewed his defiance of the royal authority. A rash hint from the king induced four barons, Reginald Fitz-Urse, William de Tracy, Hugh de Morville, and Richard Breto, to go to Canterbury and murder the archbishop while at vespers in the cathedral. He was canonized in 1172, and the splendid shrine erected at Canterbury for his remains was a favorite place of pilgrimage.

Abel, the second son of Adam. He was murdered by his brother, Cain, because his sacrifice was acceptable to Jehovah, while Cain's was not (Gen. iv:1-16). Christ calls Abel the first martyr (Matt. xxiii:35).

Abelard, PIERRE (1079-1142), an illustrious French scholastic philosopher and theologian. He went to Paris at the age of twenty, and

Abencerrages

became first a disciple and soon after a rival of Guillaume de Champeaux. A. next established himself as a philosophical lecturer in 1113, at Paris, where he obtained the chair of his former master. At this moment his reputation was immense. From Rome, England, and Germany, students hastened to listen to his eloquent logic. Poet and musician, as well as philosopher, he wrote songs in French for his students. He secretly married Heloise, the beautiful niece of Fulbert, canon of Notre Dame, who in revenge put an end to their union. A council held at Soissons in 1121 condemned his opinions on the Trinity as heretical, and soon after he withdrew to Nogent-on-the-Seine, where he built an oratory, and named it the Paraclete, or Comforter. In 1140 the pope condemned him as a heretic to perpetual silence. Two years after (1142) A. died in the abbey of St. Marcel, near Chalons-sur-Marne. A. had a great respect for the human intellect. He was a superb dialectician, and the most brilliant orator of the schools in his own age.

Abencerrages (ab-en-ser'a-jez), a distinguished Mo'rish family of Granada, the chief members of which, thirty-six in number, are said to have been massacred in the Alhambra by the king Abu-Hassan (latter half of the fifteenth century) on account of the attachment of his sister to one of them.

Ab'en Ezra (1090-1168), a celebrated Jewish rabbi. He particularly distinguished himself as a commentator on Scripture.

Abercrombie, JAMES (1706-1781), British soldier. He commanded the British forces in America in 1758, and was defeated at Ticonderoga and superseded the next year. His son James was killed at Bunker Hill.

Aberdare (dār'), a town of South Wales, in Glamorganshire, with extensive coal and iron mines in the vicinity. Pop. 38,513.

Aberdeen', a royal burgh of Scotland, in the county of the same name. It is one of the oldest towns in Scotland. The shipping trade is extensive. Among the industries are woolen, cotton, jute, and linen factories; large comb works, soap and candle works, provision-curing works, chemical-works, paper-works, ship-building yards, and establishments for preparing granite for all sorts of useful and ornamental work. Pop. 126,000. The county of Aberdeen forms the northeastern portion of Scotland. Area, 1,251,451 acres. It is generally hilly; there being in the southwest some of the highest mountains in Scotland, as Ben Macdhui (4,295 feet), Cairntoul (4,245), Cairngorm (4,090), Lochnagar, etc. Its most valuable mineral is granite, large quantities of which are exported. Cereals (except wheat) and other crops succeed well. On the banks of the upper Dee is situated Balmoral, a favorite residence of Queen Victoria. Pop. 281,331. The University of Aberdeen was formed by the union and incorporation, in 1860, by Act of Parliament, of the University and King's College of Aberdeen, founded in Old Aberdeen, in 1494, by William Elphinstone, Bishop of Aberdeen, under the au-

Abiogenesis

thority of a Papal bull obtained by James IV, and of the Marischal College and University of Aberdeen, founded in New Aberdeen, in 1593, by George Keith, Earl Marischal, by a charter ratified by Act of Parliament. The library numbers over 80,000 volumes.

Aberdeen, Earls of, a noble family of Scotland, notable for two of its members: (1) George Hamilton Gordon, 4th earl (1784-1860), "the traveled thane, Athenian Aberdeen" of Robert Burns's eulogy. His management of the Crimean war provoked much dissatisfaction. (2) John Campbell Hamilton Gordon, 7th earl. b. 1847. In 1876 he forsook the conservative party and cast his lot with W. E. Gladstone, who, in 1886, appointed him Lord Lieutenant of Ireland. In May, 1893, he was appointed governor-general of Canada, where he was very popular. His successor, the Earl of Minto, was appointed July 25, 1898, and arrived in Canada November 12.

Aberdeen, Brown co., S. Dak., 300 mi. w. of Minneapolis. Railroads, C. M. & St. P.; C. & N. W., and Great Northern. Industries, large flouring-mill. Surrounding country agricultural. The town was first settled in 1880, and became a city in 1882. Population, 1900, 4,087.

Abernethy, JOHN (1764-1831). He was an eminent English surgeon, a pupil of the celebrated John Hunter. In 1787 he became assistant surgeon to St. Bartholomew's hospital, and lecturer on anatomy and surgery. In 1815 he was elected principal surgeon. He published several medical works.

Aberra'tion, in astronomy, the difference between the true and the observed position of a heavenly body, the result of the combined effect of the motion of light and the motion of the eye of the observer caused by the annual or diurnal motion of the earth; or of the motion of light and that of the body from which the light proceeds. It was discovered by Dr. Bradley.

Aberystwith (ab-er-ist'with), a seaport and fashionable watering-place of Wales, county of Cardigan.

Abigail, the beautiful wife of Nabal, the rich churl of Carmel (1 Samuel 25), and afterward wife of David. From her speech to David the name, in modern days, has been applied generally to a female servant.

Abilene, Dickenson co., Kan., near Smoky Hill River, 163 miles from Kansas City. Railroads, U. P., C. R. I. & P., and A. T. & S. F. Industries, two cotton-mills, three flouring-mills, cigar factory, carriage shops, etc. Surrounding country agricultural and large dairy interests. The town was first settled in 1860, became a city in 1880. From 1867 to 1873 it was the northern end of the Texas cattle trail. Pop. 1900, 3,507.

Abimelech, the name of several Philistine kings, probably used as a title, like Pharaoh among the Egyptians. 1. A Philistine king of Gerar (Gen. xx:xxi). 2. Another king of Gerar (Gen. xxvi:1). 3. Son of Gideon, Judge of Israel (Judges viii:31).

Abiogenesis (a-bi-o-jen'e-sis), the doctrine

Abkasia

or hypothesis that living matter may be produced from non-living; spontaneous generation.

Abka'sia, a Russian district, at the western extremity and south of the Caucasus, between the mountains and the Black Sea. The Abkasians form a race distinguished from their neighbors in various respects. At one time they were Christians, but latterly adopted Mohammedanism. Pop. about 200,000.

Abo (ô'bô), a port in Russian Finland, the capital of Finland till 1819, when it was supplanted by Helsingfors. Pop. 23,000.

Abolitionists, a name given to the people who opposed slavery previous to the Civil War.

Abomey, the capital of the kingdom of Dahomey, in West Africa, in a fertile plain, near the coast of Guinea. Pop. 30,000.

Aboukir (â-bô-kêr') (ancient *Canopus*), a small village on the Egyptian coast, 10 miles east of Alexandria. In Aboukir Bay took place the naval battle in which Nelson annihilated a French fleet in 1798, thus totally destroying the naval power of France in the Mediterranean. Near this place on July 25, 1799, Napoleon defeated the Turks under Mustapha.

About (â-bô), EDMOND FRANÇOIS VALENTIN (1828-1885), a French novelist. He wrote in a bright, humorous, and interesting style, and his novels have been very popular.

Abracadabra, a meaningless word once supposed to have a magical efficacy as an antidote against agues and fevers.

A'braham, originally Abram, the greatest of the Hebrew patriarchs, was born at Ur in Chaldea in 2153 B.C. according to Hales, in 1996 B.C. according to Ussher, while Bunsen says he lived 2850 B.C. His two sons, Isaac and Ishmael, were the progenitors of the Hebrews and Arabs respectively.

Abruzzi, a division of Italy comprising three provinces. The interior is rugged and mountainous, being traversed throughout by the Apennines. The lower parts consist of fertile plains and valleys, yielding corn, wine, oil, almonds, saffron, etc.; area, 6,677 sq. mi.; pop, 1,386,817. The Duke of Abruzzi established a new "farthest north" record in 1900, going to lat. 86° 33', or within 241 mi. of the north pole.

Absalom, the third son of David, king of Israel. His rebellion, death, and David's touching lamentation for his son, are to be found in 2 Samuel.

Ab'sinth, French absinthe, a liquor consisting of an alcoholic solution strongly flavored with an extract of several sorts of wormwood, oil of anise, etc. When taken habitually, or in excess, its effects are very pernicious. It is a favorite drink of the Parisians.

Absolu'tion, remission of a penitent's sins in the name of God. The passages of Scripture on which the Roman Catholic Church founds in laying down its doctrine of absolution are such as Matt. 16:19; 18:18; John 20:23.

Absorb'ents, the system of minute vessels by which the nutritive elements of food and

Abyssinia

other matters are carried into the circulation of vertebrate animals. The vessels consist of two different sets, called respectively *lacteals* and *lymphatics*.

Absorp'tion, in physiology, one of the vital functions by which the materials of nutrition and growth are absorbed and conveyed to the organs of plants and animals.

Abu-Bekr, or FATHER OF THE VIRGIN, the father-in-law and first successor of Mohammed. His right to the succession was unsuccessfully contested by Ali, Mohammed's son-in-law, and a schism took place, which divided the Mohammedans into the two great sects of Sunnites and Shiites.

Abu Klea, a group of wells, surrounded by mountains, about 120 miles from Khartoum, in the Soudan.

Abu'tilon, a troublesome weed in the Middle U. S.; has been recommended for cultivation, and is called American jute, and sometimes Indian mallows.

Aby'dos, (1) an ancient city of Asia Minor, on the Hellespont, at the narrowest part of the strait, opposite Sestos. Leander, say ancient writers, swam nightly from Abydos to Sestos to see his loved Hero—a feat in swimming accomplished also by Lord Byron. (2) an ancient city of Upper Egypt, about 6 miles west of the Nile, now represented only by ruins of temples, tombs, etc. It was celebrated as the burying-place of the god Osiris. Here, in 1818, was discovered the famous *Abydos Tablet*, containing a list of the predecessors of Rameses the Great.

Abyssin'ia, a country of Eastern Africa; area, about 120,000 sq. mi.; chief divisions Tigré, Amhara, and Shoa; principal towns, Gondar and Debra Tabor. The more marked



Abyssinian — Galla boy.

physical features are a vast series of tablelands, and numerous ranges of mountains. These rise to 12,000 and 13,000 feet, while some of the peaks are always covered with snow. The principal rivers belong to the Nile basin. According to elevation there are several zones of vegetation. Within the lowest belt, which reaches an elevation of 4,800 feet, cotton, wild indigo, acacias, ebony, baobabs, sugar-canes,

Abyssinia

coffee-trees, date-palms, etc., flourish, while the larger animals are lions, panthers, elephants, rhinoceroses, hippopotamuses, jackals, hyenas, bears, numerous antelopes, monkeys, and crocodiles. The middle zone, rising to 9,000 feet, produces the grains, grasses, and fruits of southern Europe, the orange, vine, peach, apricot, the bamboo, sycamore-tree, etc. The principal grains are millet, barley, wheat, maize, and tef, the latter a small seed, a favorite bread-stuff of the Abyssinians. Two, and in some places three, crops are obtained in one year. All the domestic animals of Europe, except swine, are known. The highest zone, reaching to 14,000 feet, has but little wood, and generally scanty vegetation, the hardier corn-plants only being grown; but oxen, goats and long-wooled sheep find abundant pasture. The climate is as various as the surface; but as a whole is temperate and agreeable. The chief mineral products are sulphur, iron, copper, coal, and salt, the latter serving to some extent as money. There has been a great intermixture of races in Abyssinia. What may be considered the Abyssinians proper, seem to have a blood-relationship with the Bedouin Arabs. They belong to the Semitic race. The complexion varies from very dark through different shades of brown and copper to olive. The figure is usually symmetrical. Other races are the black Gallas from the south; the Falashas, who claim descent from Abraham, and retain many Jewish characteristics; the Agows, Gongs, etc. The great majority of the people profess Christianity, but their religion consists chiefly in the performance of empty ceremonies, and gross superstition as well as ignorance prevails. The chief spoken language is the Amharic. Mohammedanism appears to be gaining ground in Abyssinia, and in respect of morality the Moslems stand higher than the Christians. A corrupt form of Judaism is professed by the Falashas. The bulk of the people are devoted to agriculture and cattle-breeding. The trade and manufactures are of small importance. The Abyssinians were converted to Christianity in the fourth century, by some missionaries from Alexandria. Ethiopia, as the country was then called, saw its golden age in the sixth century. Since that period it has been harassed by Arab invasions and disturbed by internal revolutions. An attempt to revive the power of the ancient kingdom was commenced about the middle of the present century by King Theodore. He introduced European artisans, but his tyranny counteracted his politic measures. In consequence of the imprisonment of Consul Cameron and a number of other British subjects, in 1863, an army of nearly 12,000 men was despatched from Bombay in 1867. The force came within sight of the hill-fortress of Magdala in April, 1868. After being defeated in a battle Theodore delivered up the captives and shut himself up in Magdala, which was taken by storm on April 13, Theodore being found among the slain. Then internal dissensions

Academy

ended in the accession of Johannes, who was succeeded by Menelik, king of Shoa, who claims descent from Solomon and the Queen of Sheba. The Abyssinians have been at enmity with the Egyptians since 1860. In 1875 the Khedive of Egypt sent a small force against them, but they fell into an ambuscade and were all massacred. In the same year a second expedition of 1,600 men was sent against the Abyssinians and a short sanguinary campaign followed in which both parties lost so heavily that each was compelled to retire and the difficulties continued until the Sudan was evacuated by Egypt in 1882. In 1885 the Italians occupied Massowah, but they did not succeed in establishing friendly relations with the Abyssinians. On the 26th of July, 1887, three companies of Italian soldiers were attacked by the Abyssinians, and all were ruthlessly slaughtered, with the exception of ninety wounded. Menelek II, king of Shoa, became the supreme ruler of Abyssinia in 1889. By the treaty of Uchali, May 12, 1889, as interpreted by the Italians, Abyssinia became an Italian protectorate. King Menelek denounced this treaty in 1893, and by the convention of Adis Abeba, October 26, 1896, the independence of Abyssinia was unreservedly recognized. Pop. 1901, 3,500,000.

Aca'cia, a genus of plants, consisting of trees or shrubs with compound pinnate leaves and small leaflets, growing in Africa, Arabia, the East Indies, Australia, etc. The flowers are arranged in spikes or globular heads at the axils of the leaves near the extremity of the branches. The corolla is bell-shaped; stamens are numerous; the fruit is a dry unjointed pod. Several of the species yield gum-arabic and other gums; some have astringent barks and pods, used in tanning. An Indian species yields the valuable astringent called catechu; the wattle-tree of Australia, from 15 to 30 feet in height, is the most beautiful and useful of the species found there. Its bark contains a large percentage of tannin, and is hence exported. Some species yield valuable timber; some are cultivated for the beauty of their flowers.

Acad'emy, an association for the promotion of literature, science, or art; established sometimes by government, sometimes by the voluntary union of private individuals. The name Academy was first applied to the philosophical school of Plato, from the place where he used to teach, a grove or garden at Athens which was said to have belonged originally to the hero Acadēmus. The American Philosophical Society, the oldest scientific institution in America, was organized in 1744, in Philadelphia. The Academy of Natural Sciences of Philadelphia was organized in 1812. The American Academy of Arts and Sciences, incorporated in 1780, is located at Boston, as also the Society of Natural History. The Connecticut Academy of Arts and Sciences was organized at New Haven in 1799. The New York Academy of Sciences was incorporated as the Lyceum of Natural History in 1818. The Peabody Academy of Sci-

Acadia

ences, Salem, Mass., was endowed by George Peabody in 1867. The Smithsonian Institution, Washington, D. C., was founded by James Smithson, an English scientist, incorporated by Congress in 1846. Its publications have given it prominent standing among scientists. In the great West there are active Academies in Cincinnati, St. Louis, Chicago, Davenport, San Francisco, Cal., and New Orleans. The most celebrated institutions bearing the name of academies, and designed for the encouragement of science, antiquities, and language respectively, are the French Académie des Sciences (founded by Colbert in 1666), Académie des Inscriptions (founded by Colbert in 1663), and Académie Française (founded by Richelieu in 1635), all of which are now merged in the National Institute. The oldest of the academies instituted for the improvement of language is the Italian Accademia della Crusca (now the Florentine Academy), formed in 1582, and celebrated for the compilation of a dictionary of the Italian language, and for the publication of several editions of ancient Italian poets. In Britain the name of academy is confined almost exclusively to institutions for the promotion of the fine arts, such as the Royal Academy of Arts and the Royal Scottish Academy.

Acadia, the name formerly given to Nova Scotia. It received its first colonists from France in 1604, being then a possession of that country, but it passed to Britain, by the Peace of Utrecht, in 1713. In 1755, 18,000 of the French inhabitants were forcibly removed from their homes by the British, an incident on which is based Longfellow's *Evangeline*.

Acanthus, a genus of plants or shrubs, mostly tropical, two species of which are characterized by large white flowers and



Acanthus natural.

Acanthus of Corinthian Capital.

deeply indented shining leaves. They are favorite ornamental plants in gardens. In architecture the name is given to a kind of foliage decoration, and much employed in Roman and later styles.

Acapulco, a seaport of Mexico, on the Pacific, with a capacious, well-sheltered harbor; a coaling station for steamers, but with no great trade. Pop. 5,060.

Acarnania, the most westerly portion of Northern Greece, pop. 138,444. The Acarnanians of ancient times were behind the other Greeks in civilization, living by robbery and piracy.

Acclimatization, the process of accustoming plants or animals to live and propagate in a climate different from that to which they are indigenous, or the change which the constitution of an animal or plant undergoes

Acetylene

under new climatic conditions, in the direction of adaptation to those conditions. The systematic study of acclimatization has only been entered upon in very recent times, and the little progress that has been made in it has been more in the direction of formulating anticipative, if not arbitrary hypotheses, than of actual discovery and acquisition of facts. The term is sometimes applied to the case of animals or plants taking readily to a new country with a climate and other circumstances similar to what they have left, such as European animals and plants in America and New Zealand: but this is more properly *naturalization* than acclimatization.

Accordion, a keyed musical wind-instrument similar to the concertina; being in the form of a small box, containing a number of metallic reeds fixed at one of their extremities, the sides of the box forming a folding apparatus which acts as a bellows to supply the wind, and thus set the reeds in vibration, and produce the notes both of melody and harmony.

Accra, a British settlement in Africa, on the Gold Coast, about 75 miles east of Cape Coast Castle. Exports gold-dust, ivory, gums, palm-oil; imports cottons, cutlery, firearms, etc.

Accrington, a town of England, Lancashire, 5 miles east of Blackburn, with large cotton factories, print-works, and bleach-fields, and coal-mines adjacent. Pop. 38,603.

Accumulator, a name applied to a kind of electric battery by means of which electric energy can be stored and rendered portable. In the usual form each battery forms a cylindrical leaden vessel, containing alternate sheets of metallic lead and minium wrapped in felt and rolled into a spiral wetted with acidulated water. On being charged with electricity the energy may be preserved till required for use. See *Electricity*.

Acetates, salts of acetic acid. The acetates of most commercial or manufacturing importance are those of aluminium and iron, which are used in calico-printing; of copper, which as verdigris is used as a color; and of lead, best known as sugar of lead. The acetates of potassium, sodium, and ammonium, of iron, zinc, and lead, and the acetate of morphia, are employed in medicine.

Acetic Acid, an acid produced by the oxidation of common alcohol, and of many other organic substances. Pure acetic acid has a very sour taste and pungent smell, burns the skin, and is poisonous. From freezing at ordinary temperatures (58° or 59°) it is known as *glacial acetic acid*. Vinegar is simply dilute acetic acid, and is prepared by subjecting wine or weak spirits to the action of the air; also from malt which has undergone vinous fermentation. Acetic acid, both concentrated and dilute, is largely used in the arts; in medicine, and for domestic purposes. See *Vinegar*.

Acetylene, a pure hydro-carbon gas. It is clear, colorless, and heavy; has a distinct odor; burns with a flame of intense brilliancy. It is present in ordinary illuminating gas only to the extent of from $\frac{1}{4}$ to $1\frac{1}{2}$ per cent. The

gas is poisonous to the same extent as ordinary gas, but its characteristic odor gives warning if there is any leak. There is no odor from the gas while burning, the flame being clear, white, and steady, without smoke, and with little heat. Acetylene gas is produced, commercially, by the action of water on *calcic carbide*, and the calcic carbide is the result of *electrical fusion* of coal dust and lime in the proportion of 1,130 pounds of coal dust to 1,750 pounds of lime. The resultant is 2,000 pounds of calcic carbide. The coal dust and lime, ground together, and intimately but mechanically associated, is placed in an electric furnace. The intense heat fuses the materials, and produces a dark, gray, cinder-like substance called *calcium carbide*, or calcic carbide. The calcic carbide can be exposed to the most intense heat of a blast furnace without perceptible effect. The atmosphere does not act upon the calcic carbide to any appreciable extent, although exposure to the air, particularly if the air is moist, reduces the gas-producing power. The instant water is brought in contact with the carbide, acetylene gas is produced. A double decomposition takes place. The oxygen of water unites with the calcium of the calcic carbide, forming oxide of calcium, which falls to the bottom of the generator. The hydrogen of the water unites with the carbon of the calcic carbide, forming the acetylene, which rises and is used.

For many years acetylene gas was known as a laboratory product too expensive for anything but experimental use. A possible method of producing this gas on a commercial basis was developed in the electric furnaces of the Willson Aluminium Company, Spray, N. C., by T. L. Willson while experimenting with the production of *aluminium*, and the smelting of refractory substances under the direction of Major J. T. Morehead, president of the company, and a geologist of national reputation. In the course of the experiments, coke and lime were fused together in the *electric furnace*, and the resulting products were thrown in a bucket of water. The violent bubbling, caused by the gas, directed attention to it; a match was struck, and the gas burst into a clear flame. The development of the experiments resulted in large electric furnaces being built at Niagara Falls, and calcic or calcium carbide is now a commercial product. Portable generators for house use are made, and the carbide is sold directly to consumers, who thus make their own illuminating gas.

Achæans (â-kê'anz), one of the four main divisions of the ancient Greeks. They migrated from Thessaly to the Peloponnesus, which they ruled in the heroic period. From very early times a confederacy existed among the twelve towns of this region. After the death of Alexander the Great it was broken up, but was revived again, B. C. 280, and from this time grew in power till it spread over the whole Peloponnesus. It was finally dissolved by the Romans, B. C. 147, and after

this the whole of Greece, except Thessaly, was called Achaia or Achæa. Achaia with Elis now forms a monarchy of the kingdom of Greece. Pop. 181,632.

Achard (âk'art), FRANZ KARL (1753-1821), a German chemist, principally known by his invention (1789-1800) of a process for manufacturing sugar from beet-root.

Achates (a-kâ'têz), a companion of Æneas in his wanderings subsequent to his flight from Troy. He is always distinguished in Vergil's *Æneid* by the epithet *fidus*, "faithful," and has become typical of a faithful friend and companion.

Acheen, or Atchin (â-chên'), a native state of Sumatra, with capital of same name, in the n. w. extremity of the island, now nominally under Dutch administration. Though largely mountainous, it has also undulating tracts and low fertile plains. By treaty with Britain the Dutch were prevented from extending their territory in Sumatra by conquest; but this obstacle being removed, in 1871 they proceeded to occupy Acheen. It was not till 1879, however, that they obtained a general recognition of their authority. They were forced to evacuate part of the Acheenese territory in 1885. In the seventeenth century Acheen was a powerful state, and carried on hostilities successfully against the Portuguese, but its influence decreased with the increase of the Dutch power. The principal exports are rice and pepper. Area 19,000 sq. mi.; pop. 600,000.

Achelous (ak-e-lô'-us), now *Aspropotamo*, the largest river of Greece, rising on Mount Pindus, separating Ætolia and Acarnania, and falling into the Ionian Sea. Achelous was the river-god of Greece.

Acheron (ak'e-ron), the ancient name of several rivers in Greece and Italy, all of which were connected by legend with the lower world.

Achill (ak'il), or Eagle Island, the largest island on the Irish coast. Area, 51,521 acres, mostly bog. The chief occupation of the 5,000 inhabitants is fishing.

Achilles (a-kil'êz), a Greek legendary hero, the chief character in Homer's *Iliad*. He was the son of Peleus, and of the Nereid Thetis, was instructed in eloquence and the arts of war by Phœnix, and in medicine by the centaur Cheiron. He led the Myrmidons to Troy in fifty ships, and was there the great bulwark of the Greeks. Being deprived by Agamemnon of Briseïs, he ceased to take further part in the war, and the fortunes of the Greeks became desperate. He reconciled himself to Agamemnon, attacked the Trojans, and slew their bravest warrior, Hector. A legend represents his mother as having dipped him in the Styx to render him invulnerable, in which she succeeded with the exception of the ankles, by which she held him.

Achilles' Tendon, Tendon of Achilles, the strong tendon which connects the muscles of the calf with the heel, and may be easily felt with the hand. The origin of name is from the myth of Achilles' immersion in the river Styx.

Acid (Latin, *acidus*, sour), a name popularly

Aclerage

applied to a number of compounds, solid, liquid, and gaseous, having more or less the qualities of vinegar (itself a diluted form of acetic acid), the general properties assigned to them being a tart, sour taste, the power of changing vegetable blues into reds, of decomposing chalk and marble with effervescence, and of being in various degrees neutralized by alkalis. An acid has been defined as a substance containing hydrogen, which hydrogen is in whole or in part replaceable by a metal when the metal is presented in the form of a hydrate; being *monobasic*, *diebasic*, or *tribasic*, according to the number of hydrogen atoms replaced.

Aclerage (ā' se- ér-āj), a process by which an engraved copper-plate or an electrotype from an engraved plate of steel or copper has a film of iron deposited over its surface by electricity in order to protect the engraving from wear in printing. By this means an electrotype of a fine engraving, which, if printed directly from the copper, would not yield 500 good impressions, can be made to yield 3,000 or more; and when the film of iron becomes so worn as to reveal any part of the copper, it may be removed and a fresh coating deposited so that 20,000 good impressions may be got.

Acì Reale (ä' che-rä-ä'lā), a seaport of Sicily, with a trade in corn, wine, fruit, etc. Pop. 24,100.

Aclín'ic Line, the magnetic equator, an irregular curve in the neighborhood of the terrestrial equator, where the magnetic needle balances itself horizontally, having no dip.

Aconcagua (ä-kon-kä'gwä), a province, a river, and a mountain of Chile. The peak of Aconcagua, rising to the height of 22,860 feet, is one of the highest summits of the western hemisphere. Area of prov., 6,224 sq. mi. Pop. 133,830. Capital, San Felipe.

Ac'onite, a genus of hardy herbaceous plants, represented by the well-known wolf's-bane or monk's-hood, and remarkable for their poisonous properties and medicinal qualities, being used internally as well as externally in rheumatism, gout, neuralgia. Aconitine is an alkaloid extracted from aconite, a virulent poison.



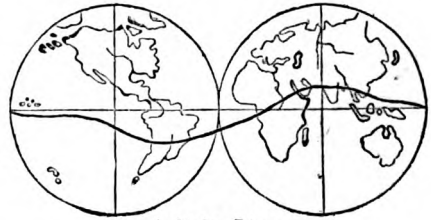
Aconquija (ä-kon-ké'hä), a range of mountains in the Argentine Republic; the name also of a single peak, 17,000 feet high.

Acotyle'dons, plants not furnished with cotyledons or seed-lobes. They include ferns,

Acre

mosses, sea-weeds, etc., and are also called flowerless plants.

Acoustics (a-kou'stikis), the science of sound. It teaches the cause, nature, and phenomena of such vibrations of elastic bodies as affect the organ of hearing; the manner in which sound is produced, its transmission through air and other media, the doctrine of reflected sound or echoes, the properties and effects of different sounds, including musical sounds or notes, and the structure and action of the organ of hearing, etc. The propagation of sound is analogous to that of light, both being due to vibrations which produce successive waves, and Newton was the first to show that its propagation through any medium depended upon the elasticity of that medium. Regarding the intensity, reflection, and refraction of sound, much the same rules apply as in light. In ordinary cases of hearing, the vibrating medium is air, but all substances capable of vibrating may be employed to propagate and convey sound. When a bell is struck its vibrations are communicated to the particles of air surrounding it, and from these to particles outside them, until they reach the ear of the listener. The intensity of sound varies inversely as the square of the distance of the body sounding from the



Aclínic Line.

ear. Sound travels through the air at the rate of about 1,090 feet per second; through water at the rate of about 4,700 feet. Sounds may be musical or non-musical. A musical sound is caused by a regular series of exactly similar pulses succeeding each other at precisely equal intervals of time. If these conditions are not fulfilled the sound is a noise. Musical sounds are comparatively simple, and are combined to give pleasing sensations according to easy numerical relations. The *loudness* of a note depends upon the *degree* to which it affects the ear; the *pitch* of a note depends on the *number* of vibrations to the second which produce the note; the *timbre*, *quality*, or *character* of a note depends on the *body* or *bodies* whose vibrations produce the sound, and is due to the form of the paths of vibrating particles. The gamut is a series of eight notes, which are called by the names Do, Re, Mi, Fa, Sol, La, Si, Do. The properties of sound were mathematically investigated by Bacon and Galileo, but it remained for Newton, Lagrange, Euler, Laplace, Helmholtz, etc., to bring the science to its present state.

Acre, a standard measure of land, used in the U. S. and England. The acre consists of 4,840 square yards, divided into 4 roods.

Acre (ä'ker), a seaport of Syria, in northern Palestine, on the Bay of Acre, early a place of

Acropolis

great strength and importance. Taken from the Saracens under Saladin in 1191 by Richard I of England and Philip of France; bravely defended by the Turks assisted by Sir Sidney Smith in 1799 against Napoleon; in 1832, taken by Ibrahim Pasha; in 1840, bombarded by a British, Austrian, and Turkish fleet, and restored to the sultan of Turkey. Pop. 10,000.

Acrop'olis, the citadel or chief place of a Grecian city, usually on an eminence commanding the town. That of Athens contained some of the finest buildings in the world, such as the Parthenon, Erechthæum, etc.

Acros'tic, a poem of which the first or last, or certain other letters of the line, taken in order, form some name, motto, or sentence. A poem of which both first and last letters are thus arranged is called a double acrostic. In Hebrew poetry, the term is given to a poem, of which the initial letters of the lines or stanzas were made to run over the letters of the alphabet in their order, as in Psalm 119. Acrostics have been much used in complimentary verses, the initial letters giving the name of the person eulogized.

Acte'on, in Greek mythology, a great hunter, turned into a stag by Artémis (Diana) for looking on her when she was bathing, and torn to pieces by his own dogs.

Ac'tinism, the property of those rays of light which produce chemical changes, as in photography, in contradistinction to the light rays and heat rays. The actinic property or force begins among the green rays, is strongest in the violet rays, and extends a long way beyond the visible spectrum.

Actinozo'a, a class of animals including sea-anemones, corals, etc., all having rayed tentacles round the mouth.

Action, the mode of seeking redress at law for any wrong, injury, or deprivation. Actions are divided into civil and criminal, the former again being divided into real, personal, and mixed.

Ac'tium, a promontory on the western coast of Northern Greece, memorable on account of the naval victory gained here by Octavianus (afterward the Emperor Augustus) over Antony and Cleopatra, Sept. 2, B. C. 31. Cleopatra fled with sixty Egyptian ships, and Antony fled with her to Egypt. The deserted fleet was overcome after a brave resistance. Antony's land forces went over to the enemy.

Acts of the Apostles, one of the books of the New Testament, written in Greek by St. Luke, probably in A. D. 63 or 64. It embraces a period of about thirty years, beginning immediately after the Resurrection, and extending to the second year of the imprisonment of St. Paul in Rome.

Acupress'ure, a means of arresting bleeding from a cut artery introduced by Sir James Simpson in 1859, and consisting in compressing the artery above the orifice, that is, on the side nearest the heart, with the middle of a needle introduced through the tissues.

Acupunc'ture, a surgical operation, consisting in the insertion of needles into certain parts

Adams

of the body for alleviating pain, or for the cure of different species of rheumatism, neuralgia, eye diseases, etc. It is easily performed, gives little pain, causes neither bleeding nor inflammation, and seems at times of surprising efficacy.

Adal', a country in Africa, east of Abyssinia, inhabited by a dark-brown race of same name, of nomadic habits, Mohammedans in religion; towns Aussa and Tajurrah. Part of the coast here is held by the French.

Ad'albert of Prague (955-997), called "the apostle of the Prussians," son of a Bohemian nobleman, appointed bishop of Prague in 983, labored in vain among the heathenish Bohemians, resolved to convert the pagans of Prussia, but was murdered in the attempt.

Adam, ROBERT (1728-1792), an eminent Scottish architect. He was employed by the English nobility and gentry in constructing modern and embellishing ancient mansions. Among his works are the Register House and the University buildings, Edinburgh, the royal Infirmary, Glasgow, and the Adelphi Buildings, London. He was buried in Westminster Abbey.

Adam and Eve, the names given in Scripture to our first parents, an account of whom and their immediate descendants is given in the early chapters of Genesis.

Adam de la Hale (1240-1287), French writer and musician. His *Jeu de Robin et de Marion* may be regarded as the first comic opera ever written.

Adama'wa, a region of Central Africa, also called *Fumbina*. Much of the surface is hilly or mountainous. A great part of the country is covered with thick forests. The inhabitants are industrious and intelligent. Slaves and ivory are the chief articles of trade. Chief town, Yola.

Adams, Berks co., Mass., a prosperous manufacturing village 20 miles from Pittsfield. Pop. 11,134.

Ad'ams, CHARLES FRANCIS (1807-1886), American author and statesman, son of John Quincy Adams. His youthful years were spent in Europe, partly in England, but he finished his education at Harvard, and afterward studied law. After serving some years in the Massachusetts legislature was elected to Congress in 1858. In 1861 he was sent to England as American minister, and here he remained for seven years, performing the arduous duties of his office with the utmost tact and ability. He has edited a complete edition of his grandfather's works in ten volumes, with a life. He was one of the arbitrators on the Alabama claims.

Adams, CHARLES FRANCIS, JR., second son of the above, born in Boston, 1835, graduated at Harvard, 1856, and admitted to the bar, 1858. He served in the Union army 1861-1865. He was appointed on the board of railroad commissioners for Massachusetts, 1869, and in 1884 president of the Union Pacific railway. He published *Chapters of Erie and other Essays*.

Adams, CHARLES KENDALL, b. 1835 at Derby,

Adams

Vt. He graduated at the University of Michigan in 1861. He was made assistant professor there in 1863 and full professor in 1868. He became non-resident professor of history at Cornell University in 1881, and in 1885 succeeded Andrew D. White as president. He is the author of *Democracy and Monarchy in France* (1874), and of *A Manual of Historical Literature* (N. Y. 1882). He became president of the University of Wisconsin in 1892, resigned in 1901, and died July 26, 1902.

Adams, GEORGE EVERETT, b. 1840 at Keene, N. H., graduated at Harvard, 1860. He moved to Chicago and practised law; elected state senator in 1880; elected to Congress from the fourth district in 1882 and re-elected three times. He is a Republican.

Adams, HENRY, b. 1838, was professor of history at Harvard 1870-1877. He has written several historical works. The youngest son of Charles Francis Adams.

Adams, JOHN (1735-1826), second president of the U. S., was born at Braintree (now Quincy), Massachusetts. He was educated at Harvard University, and adopted the law as a profession. His attention was directed to politics by the question as to the right of the English Parliament to tax the colonies, and in 1765 he published some essays strongly opposed to the claims of the mother country. As a member of the new American Congress in 1774, 1775, and 1776, he was strenuous in his opposition to the home government, and in organizing the various departments of the colonial government. On 13th May, 1776, he seconded the motion for a declaration of independence proposed by Lee of Virginia, and was appointed a member of committee to draw it up. The declaration was actually drawn up by Jefferson, but it was Adams who carried it through Congress. In 1778 he went to France on a special mission, but soon came back and again returned, and for nine years resided abroad as representative of his country in France, Holland, and England. After taking part in the peace negotiations he was appointed, in 1785, the first ambassador of the U. S. to the court of St. James. He was recalled in 1788, and in the same year elected vice-president of the republic under Washington. In 1792 he was re-elected vice-president, and at the following election in 1796 was chosen president in succession to Washington. The commonwealth was then divided into two parties, the federalists, who favored aristocratic, and were suspected of monarchic views, and the republicans or democrats. Adams adhered to the former party, with which his views of government had always been in accordance, but the real leader of the party was Hamilton, with whom Adams did not agree, and who tried to prevent his election. His term of office proved a stormy one, which broke up and dissolved the federalist party. His re-election in 1800 was again opposed by the efforts of Hamilton, which ended in effecting the return of the democratic candidate Jefferson. Thus Adams retired from office into the obscurity of private life.

Adams

He had the consolation of living to see his son president. He died 4th July, 1826, the fiftieth anniversary of the declaration of independence, and on the same day as Jefferson. His works have been ably edited by his grandson Charles Francis Adams.

Adams, JOHN COUCH (1819-1892), an English astronomer. His investigations into the irregularities in the motion of the planet Uranus led him to the conclusion that they must be caused by another more distant planet. The French astronomer, Leverrier, had come to substantially the same results, which, being published in 1846, led to the actual discovery of the planet Neptune by Galle of Berlin. In 1858 Adams was professor of astronomy and geometry at Cambridge.

Adams, JOHN QUINCY (1767-1848), sixth president of the U. S., son of John Adams, second president. He accompanied his father to Europe and was educated there in part, but graduated at Harvard in 1788. He was admitted to the bar in 1791. He began to take an active interest in politics, and some letters that he wrote having attracted general attention, in 1794 Washington appointed him minister to the Hague. He afterward was sent to Portugal, and by his father to Berlin. In 1798 he received a commission to negotiate a treaty of commerce with Sweden. On the accession of Jefferson to the presidency in 1801 he was recalled. The federalist party (that of his father), which was now declining, had sufficient influence in Massachusetts to elect him to the senate in 1803. In 1809 he went as ambassador to Russia. He assisted in negotiating the peace of 1814 with England, and was afterward appointed resident minister at London. Under Monroe as president he was secretary of state, and at the expiration of Monroe's double term of office he succeeded him in the presidency (1825). He was not very successful as president, and at the end of his term (1829) he was not re-elected. In 1831 he was returned to Congress by Massachusetts, and continued to represent this state till his death, his efforts being now chiefly on behalf of the abolitionist party.

Adams, JOHN QUINCY, b. 1833, was a member of the Massachusetts legislature, and contested the gubernatorial chair in 1867 and 1871. The oldest son of Charles F. Adams. D. 1894.

Adams, SAMUEL (1722-1803), an American statesman, second cousin of President John Adams. He early devoted himself to politics, and in connection with the dispute between America and the mother country he showed himself one of the most unwearied, efficient, and disinterested assertors of American freedom and independence. He was one of the signers of the declaration of 1776, which he labored most indefatigably to bring forward. He sat in Congress eight years, in 1789-94 was lieutenant-governor of Massachusetts, in 1794-97 governor, when he retired from public life.

Adams, WILLIAM T. (1822-1897), born in Medway, Mass., better known by his pseudonym "Oliver Optic," a popular writer of

Adam's Bridge

books for boys, was of the same family as the two presidents. Of his 36 volumes over half a million copies have been sold.

Adam's Bridge, a chain of reefs, sandbanks, and islands stretching between India and Ceylon; so called because the Mohammedans believe that when Adam was driven from paradise he had to pass by this way to Ceylon (where is also Adam's Peak).

Adam's Peak, one of the highest mountains in Ceylon 45 mi. e. s. e. of Colombo, conical, isolated, and 7,420 feet high. On the top, a rocky area of 64 ft. by 45, is a hollow in the rock 5 feet long bearing a rude resemblance to a human foot, which the Brahmans believe to be the footprint of Siva, the Buddhists that of Buddha, the Mohammedans that of Adam. Devotees of all creeds here meet and present their offerings (chiefly rhododendron flowers) to the sacred footprint. The ascent is very steep, and toward the summit is assisted by steps cut and iron chains riveted in the rock.

Ad'dax, a species of antelope of the size of a large ass with much of its make. The horns of the male are about 4 feet long, beautifully twisted into a wide sweeping spiral of two turns and a half, with the points directed outward. It has tufts of hair on the forehead and throat, and large broad hoofs. It inhabits the sandy regions of Nubia and Kordofan, and is also found in Caffraria.

Addison, JOSEPH (1672-1719), the most exquisite of English essayists, the founder of periodical literature, and poet, was the son of Rev. L. Addison, Dean of Lichfield, and was born at Milston, in Wiltshire. As a boy he made the acquaintance of Steele, afterward his coadjutor on the *Tatler* and *Spectator*. He graduated from Oxford M. A. in 1693. He traveled in Italy for two years, returning to England in 1703. While in Italy he penned his poetical *Letter* to Lord Halifax. In 1704 he wrote *The Campaign*, a poem addressed to the Duke of Marlborough, became member of Parliament in 1708, and in 1717 he was appointed secretary of state. He died at Holland House. A. commenced to write for the *Tatler* in 1709, and for its successor, the *Spectator*, in 1711. His tragedy of *Cato*, produced in 1713, met with unbounded success. Of his poetry one or two sacred pieces will endure as long as the language; but it is as an essayist that he is best known. For humor and poetic grace; for satire and for moral influence the essays of the *Spectator* remain unsurpassed. Plate 2, Vol. I.

Address, Forms of. The following are the principal modes of formally addressing titled personages or persons holding official rank in Great Britain and the U. S.:—

The King or Queen.—Address in writing: To the King's (Queen's) most excellent Majesty. Say: Sire or Madam, Your Majesty.

The Royal Family.—His Royal Highness (H. R. H.) the Prince of Wales, His Royal Highness the Duke of C—, His Royal Highness Prince A—.

Duke and Ducal Family.—His Grace the Duke of —; My Lord Duke, Your Grace. The duke's eldest son takes a secondary title

Adenanthera

of his father, and is addressed as if he held it by right. A younger son is addressed, The Right Honorable Lord J— B—.

Marquis.—The Most Honorable the Marquis of —, My Lord Marquis, My Lord.

Earl.—The Right Honorable Earl of —; My Lord, Your Lordship. The Right Honorable the Countess of —; Madam, Your Ladyship.

Viscount.—The Right Honorable Lord Viscount —; My Lord, Your Lordship. The Right Honorable the Viscountess —; Madam, Your Ladyship.

Baron.—The Right Honorable Lord —; My Lord, Your Lordship.

Knight.—Sir C— D—, Kt., or K. G., K. C. B., R. G. C. B., etc., according to rank. The wives of baronets and knights are styled Lady —.

Archbishop.—His Grace the Lord Archbishop of —; My Lord Archbishop; Your Grace.

Bishop.—The Right Rev. the Lord Bishop of —; My Lord.

Dean.—The Very Reverend; Sir; Mr. Dean. Members of the Privy Council, the Speaker of the House of Commons, the Lord Chancellor, Lord Advocate, are called Right Honorable; members of Parliament, Honorable.

The Lord Mayors of London, York, and Dublin are styled Right Honorable.

In the U. S. persons holding official rank are similarly addressed; thus the President is styled His Excellency, as are also governors of states and foreign ministers; the vice-president, lieutenant-governors, senators, representatives, judges, and mayors are styled Honorable.

Adelaide (ad'e-lād), the capital of South Australia, founded in 1837, and named after the queen of William IV. The public buildings comprise the government house, court houses, the houses of legislature, the University, South Australian Institute, etc. Adelaide is connected by railway with Melbourne, and is the terminus of the overland telegraph to Port Darwin. Pop. 147,616.

Adelung (äd'e-lung), JOHANN CHRISTOPH (1732-1806), a German philologist. In 1759 he was appointed professor in the Protestant academy at Erfurt, and two years after removed to Leipzig, where he applied himself to his German dictionary (Leipzig, 1774-86), and his *Mithridates*, a work on general philology. In 1787 he was appointed librarian of the public library in Dresden.—FRIEDRICH VON ADELUNG (1768-1843), nephew of the above, also distinguished himself as a philologist. He became president of the Academy of Sciences at St. Petersburg.

A'den, a seaport town and territory on the southwest coast of Arabia. Occupying an important military position, Aden is strongly fortified and permanently garrisoned. Pop. 35,165.

Adenanthe'ra, a genus of trees and shrubs, natives of the East Indies and Ceylon. It includes one of the largest and handsomest trees of India, which yields hard solid timber called red sandal-wood. The bright scarlet seeds,

Adhesion

from their equality in weight (each=4 grains), are used by goldsmiths in the East as weights,

Adhesion, the tendency of two bodies to stick together when put in close contact, or the mutual attraction of their surfaces; distinguished from *cohesion*, which denotes the mutual attraction between the particles of a homogeneous body. Adhesion may exist between two solids, between a solid and a fluid, or between two fluids. A plate of glass or of polished metal laid on the surface of water and attached to one arm of a balance will support much more than its own weight in the opposite scale from the force of adhesion between the water and the plate. From the same force arises the tendency of most liquids, when gently poured from a jar, to run down the exterior of a vessel or along any other surface they meet.

Adige (ä'dē-jā), (German, Etsch), a river of Northern Italy, which rises in the Rhaetian Alps, and after a south and east course of about 180 miles, during which it passes Verona and Legnago, falls into the Adriatic, forming a delta connected with that of the Po.

Adiron'dack Mountains, a group belonging to the Appalachian chain, extending from the n. e. corner of the state of New York to near its center. The scenery is wild and grand, diversified by numerous beautiful lakes, and the whole region is a favorite resort of sportsmen and tourists. The district has been preserved in its natural beauty by state legislation constituting it a public park.

Adjutant-bird, a large wading bird of the stork family, native of the warmer parts of India. It stands about five feet high, has an enormous bill, and a pouch hanging from the under part of the neck. It is one of the most voracious carnivorous birds known, and in India, from its devouring all sorts of carrion and noxious animals, is protected by law. From underneath the wings are obtained those light downy feathers known as *marabou* feathers, from the name of an allied species of bird in Western Africa, and also producing them.

Adler, FELIX, b. 1851, in Germany. He graduated at Columbia college in 1870, and studied at Berlin and Heidelberg. He was Professor of Hebrew and Oriental literature at Cornell 1874-76, and is at the head of the Society of Ethical Culture, New York City.



Adjutant-bird.

Adrar

Adme'tus, in Greek mythology, king of Phææ, in Thessaly, and husband of Alcestis, who gave signal proof of her attachment by consenting to die in order to prolong her husband's life.

Admiralty Charts. These charts are so called because they were first issued by the Admiralty Board of England. The charts give a minute description of the waters along the sea coast and the shores of navigable lakes, locating all sunken rocks, shoals, and other obstructions to navigation. They also give the depth in fathoms of all waters around harbors and along the coast where surveys have been completed. In the United States the charts are issued by the United States Coast Survey. All vessels are required to carry a full set of charts describing the waters that they navigate. These charts are also issued by France and Russia. They are all made with the greatest care, and contain accurate and valuable information.

Admiralty Island, an island belonging to the U. S. off the n. w. coast of N. A., 80 or 90 miles long and about 20 broad, covered with fine timber and inhabited by Sitka Indians.

Admiralty Islands, a cluster of islands, north of New Guinea, belonging to Germany. The largest is about 60 miles in length. They possess dense groves of cocoa-nut trees. The islanders are of a tawny color, have no metal (except what is imported), but use tools of stone and shell.

Adobe (ä-dō'bā), the Spanish name for a brick made of loamy earth, containing about two thirds fine sand and one third clay dust, sun dried; in common use for building in Mexico, Texas, and Central America.

Ado'ni, a town and district in Madras, India; population of former 22,732, of latter 179,448. Well known for excellent silk and cotton fabrics.

Ado'nis, a mythological personage, originally a deity of the Phœnicians, but borrowed into Greek mythology. See *Mythology*.

Ado'nis, a genus of plants. In the corn-adonis or pheasant's eye the petals are bright scarlet like the blood of Adonis, from which the plant is fabled to have sprung.

Adour (ä-dör), a river of France, rising in the Pyrenees, and falling into the sea a little below Bayonne; length about 200 miles; partly navigable.

Ado'wa, a town of Abyssinia in Tigré, at an elevation of 6,270 feet; the chief commercial depôt on the caravan route from Massowa to Gondar. Pop. about 6,000.

Adra (ä'dra), a seaport of southern Spain, in Andalusia, near the mouth of the Adra, on the Mediterranean; with marble quarries and lead works which gave employment to most of the inhabitants, and furnished most of the business of the port. The ancient town of Abdera, founded by the Phœnicians, occupied a hill near the site of the present town. The exports are wheat, grapes, sugar, lead and marble. The population is estimated at 10,000.

Adrar', a district in the western Sahara of Africa, peopled by Berbers possessing camels, sheep, and oxen, and cultivating dates, wheat,

Adria

barley, and melons. Chief towns, Wadan, and Shingit, which has inexhaustible beds of rock-salt.

Adria (ä'dri-ä), a cathedral city of northern Italy, province of Rovigo, between the Po and the Adige, on the site of the ancient town of same name, whence the Adriatic derives its appellation. Owing to alluvial deposits, the sea is now 17 miles distant. Pop. 11,554.

Adrian, the name of six popes of Rome. The first ruled from 772-795; a contemporary and friend of Charlemagne.—**ADRIAN II** was elected pope in 867, at the age of seventy-five years. He died in 872, in the midst of conflicts with the Greek Church.—**ADRIAN III**, elected 884, was pope for one year and four months only.—**ADRIAN IV**, originally named *Nicolas Breakspear*, the only Englishman that ever occupied the papal chair, was born about 1100, and died 1159. He studied in France, and became abbot of St. Rufus in Provence. He became pope in 1154. During his reign was begun the long contest with the German House of Hohenstaufen, which finally brought about the overthrow of that dynasty.—**ADRIAN V** settled the dispute between King Henry III, of England, and his nobles, in favor of the former; but died a month after his election to the papal chair (1276).—**ADRIAN VI**, born at Utrecht, in 1459. He studied at Louvain and there became professor of theology; was successively Bishop of Tortosa, a cardinal, and regent of Spain for Charles V. He was elected pope in 1522, but died the next year.

A'drian, Lenawee co., Mich., 70 miles w. s. w. of Detroit. Its extensive water-power is employed in works of various kinds. Pop. 1900, 9,654.

Adriano'ple, an important city of Turkey, about 135 miles w. n. w. from Constantinople. It has a great mosque, a palace, now in a state of decay, a grand aqueduct, and a splendid bazar; manufacturers of silk, woolen, and cotton stuffs, otto of roses, leather, etc., and an important trade. Adrianople was the residence of the Turkish sovereigns till the conquest of Constantinople in 1453. In 1829 it was taken by the Russians. The Russians occupied it also in 1878. Pop. 60,000.

Adria'tic Sea, or **GULF OF VENICE**, an arm of the Mediterranean, stretching in a north-westerly direction from the Straits of Otranto, between Italy and the Turkish and Austrian dominions. Length, about 480 miles; average breadth, about 100; area, about 60,000 sq. mi.

Adul'lam, **CAVE OF**, a cave to which David fled when persecuted by Saul. 1 Sam. 22:1, 2.

Adultera'tion, a term not only applied in its proper sense to the fraudulent mixture of articles of commerce, food, drink, drugs, seeds, etc., with noxious or inferior ingredients, but also by magistrates and analysts to accidental impurity, and even in some cases to actual substitution. The chief objects of adulteration are to increase the weight or volume of the article, to give a color which either makes a good article more pleasing to the eye or else disguises

Ægina

an inferior one, to substitute a cheaper form of the article, or the same substance from which the strength has been extracted, or to give it a false strength. Among the adulterations which are practised for the purpose of fraudulently increasing the weight or volume of an article are the following:—Bread is adulterated with alum or sulphate of copper which gives solidity to the gluten of inferior flour; with chalk or carbonate of soda to correct the acidity of such flour; and with boiled rice or potatoes, which enables the bread to carry more water, and thus to produce a larger number of loaves from a given quantity of flour. Milk is usually adulterated with water. The adulterations generally present in butter consist of an undue proportion of salt and water, lard, tallow, and other fats. Genuine butter should not contain less than 80 per cent. of butter-fat. Tea is adulterated (chiefly in China) with sand, iron-filings, chalk, gypsum, China clay, exhausted tea leaves, and the leaves of the sycamore, while color and weight are added by black-lead, indigo, Prussian-blue, gum, turmeric, soapstone, and other substances. Coffee is mingled with chicory, roasted wheat, roasted beans, acorns, rye-flour, and colored with burned sugar, and other materials. Chicory is adulterated with different flours, as rye, wheat, beans, etc., and colored with burned sugar, Venetian red, etc.

Tobacco is mixed with sugar and treacle, aloes, liquorice, oil, alum, etc., and such leaves as rhubarb, chicory, cabbage, burdock, besides excess of salt and water. Confections are adulterated with flour and sulphate of lime. Pepper is adulterated with linseed-meal, flour, mustard husks, etc. Color is given to pickles by salts of copper, acetate of copper, etc. Brandy is diluted with water, and burned sugar is added to improve the color. Gin is mixed with excess of water, and flavoring matters are added. For champagne, gooseberry and other inferior wines are often substituted. Medicines, such as jalap, opium, rhubarb, aloes, sarsaparilla, squills, etc., are mixed with various foreign substances. Castor-oil has been adulterated with other oils; and inferior oils are often mixed with cod-liver oil. The adulteration of seeds is largely practised. Thus turnip-seed is mixed with rape, wild mustard, or charlock. Clover is also much mixed with plantain and mere weeds. Laws against adulteration have been passed in various countries and at various times.

Ægean Sea (ë-jë'an), that part of the Mediterranean which washes the eastern shores of Greece, the southern coast of Turkey, and the western coast of Asia Minor.

Ægina (ë-jí'na), a Greek island; area about 32 sq. mi.; pop. 7,000. Except in the west, where the surface is more level, the island is mountainous and unproductive. The inhabitants are chiefly engaged in trade, seafaring, and agriculture, the chief crops being almonds, olives, and grain. In 456 B. C. the island fell under the power of the Athenians, and in

431 the Æginetans were expelled to make room for Athenian settlers, but were afterward restored. On a hill are the remains of a splendid temple of Athena (Minerva). Here were found in 1811 a number of marble statues (the *Æginetan marbles*), which are now at Munich.

Ægis (ē'jīs), the shield of Zeus, according to Homer. In a figurative sense the word is used to denote some shielding or protecting power.

Ægospot'ami ('goat-river'), a place on the Hellespont, of some note in Greek history, the Athenian fleet being here completely defeated in 405 B. C. by the Spartan Lysander, thus ending the Peloponnesian war.

Æne'as, the hero of Vergil's *Æneid*, a Trojan, who, according to Homer, was, next to Hector, the bravest of the warriors of Troy. See *Vergil*.

Æolian Harp, a musical instrument, generally consisting of a box of thin fibrous wood, to which are attached from eight to fifteen fine catgut strings or wires, stretched on low bridges at each end, and tuned in unison. Its length is made to correspond with the size of the window or other aperture in which it is intended to be placed. When the wind blows athwart the strings, it produces very beautiful sounds, sweetly mingling all the harmonic tones, and swelling or diminishing according to the strength or weakness of the blast. It is said to have been invented by the German Jesuit, Athanasius Kerches (1602-1680).

Æolus, in Greek mythology the god of the winds, which he kept confined in a cave in the Æolian Islands, releasing them when he wished or was commanded by the superior gods.

Æpyor'nis, a genus of gigantic birds whose remains have been found in Madagascar, where it is supposed to have lived perhaps not longer than 200 years ago. It had three toes, and is classed with the ostrich, etc. Its eggs measured 14 inches in length, being about six times the bulk of those of the ostrich.

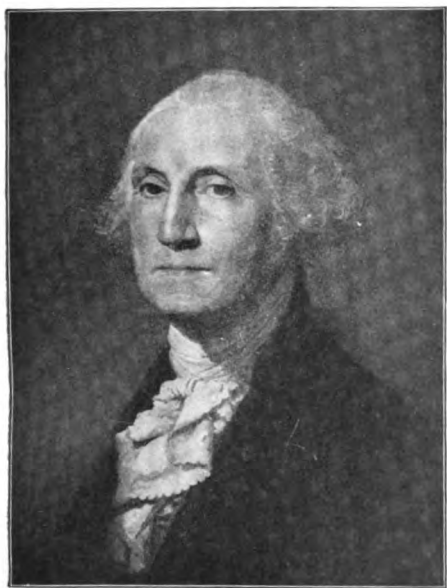
Ærated Bread.—The raising of bread in baking is accomplished in two distinct ways. By the fermentation process carbonic acid gas is generated in the dough by induced alcoholic fermentation, but when the carbonic acid is developed from a foreign substance or introduced from without, ærated or unfermented bread is the result. The principal method of manufacturing A. B. is by a process patented by the late Dr. Darglish. It consists in making dough with water charged with carbonic acid under high pressure, which renders the mass uniformly spongy throughout. The water for mixing is charged with carbonic acid in the same manner plain Ærated Water is prepared, and the mixing is accomplished in a strong cast-iron cylinder, in which a series of arms revolves by steam-power. The dough is expelled from the lower end of the cylinder into a box which is gauged to hold a two-pound loaf, and from the box it is removed into pans for firing without any portion of the material ever being handled.

Ærated Waters, waters impregnated with

carbonic acid gas, and forming effervescing beverages. Some mineral waters are naturally ærated, as Vichy, Apollinaris, Rosbach, etc.; others, especially such as are used for medicinal purposes, are frequently ærated to render them more palatable and exhilarating. Water simply ærated, or ærated and flavored with lemonade or fruit syrups, is largely used, especially in summer, as a refreshing beverage.

Ærolite, a meteoric stone, meteorite, or shooting-star. See *Meteor*.

Aeronau'tics, the art of sailing in or navigating the air. The first form in which the idea of aerial locomotion naturally suggested itself was that of providing men with wings by which they should be enabled to fly. It is now, however, the general opinion of scientific men that it is impossible for man by his muscular strength alone to give motion to wings of sufficient extent to keep him suspended in the air. But although the muscles of man may be of insufficient strength to enable him to use such wings, there yet remains the possibility of making a flying car, elevated and propelled by machinery, or a boat to float in the air. The navigation of the air by means of the balloon dates only from nearly the close of the eighteenth century. In 1766 Henry Cavendish showed that hydrogen gas was at least seven times lighter than ordinary air, and it at once occurred to Dr. Black of Edinburgh that a thin bag filled with this gas would rise in the air, but his experiments were for some reason unsuccessful. Some years afterward Tiberius Cavallo found that a bladder was too heavy and paper too porous, but in 1782 he succeeded in elevating soap-bubbles by inflating them with hydrogen gas. In this and the following year two Frenchmen, the brothers Stephen and Joseph Montgolfier, acting on the observation of the suspension of clouds in the atmosphere and the ascent of smoke, were able to cause several bags to ascend by rarefying the air within them by means of a fire below. These experiments roused much attention at Paris; and soon after a balloon was constructed under the superintendence of Professor Charles, which being inflated with hydrogen gas rose over 3,000 feet in two minutes, disappeared in the clouds, and fell after three quarters of an hour about 15 miles from Paris. These Montgolfier and Charles balloons already represented the two distinct principles in respect to the source of elevating power, the one being inflated with common air rarefied by heat, requiring a fire to keep up the rarefaction, the other being filled with gas lighter at a common temperature than air, and thus rendered permanently buoyant. Both forms were used for a considerable time, but the greater safety and convenience of the gaseous inflation finally prevailed. After the use of coal-gas had been introduced it superseded hydrogen gas, as being much less expensive, though having a far less elevating power. The first person who made an ascent in a balloon was Pilâtre de Rozier, who ascended 50 feet at Paris in 1783 in one of Montgolfier's.



PRESIDENTS

George Washington
William McKinley

Abraham Lincoln
Theodore Roosevelt

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A short time afterward M. Charles and M. Robert ascended in a balloon inflated with hydrogen gas, and traveled a distance of 27 miles from the Tuileries; M. Charles by himself also ascended to a height of about 2 miles. Blanchard with the American Dr. Jeffries, first crossed the Channel from Dover to Calais, in 1785; Garnerin, who first descended by a parachute from a balloon in October, 1797; and Gay-Lussac, who reached the height of 23,000 feet in September, 1804. In 1836 a balloon carrying Messrs. Green, Holland, and Mason traversed the 500 miles between London and Weilburg in Nassau in eighteen hours. In 1859 Mr. J. Wise, the chief of American aeronauts, accompanied by several others, rose from New York, and landed, after a flight of 1,150 miles, in twenty hours. In September, 1862, the renowned aeronaut, Mr. Glaisher, accompanied by Mr. Coxwell, made an ascent from Wolverhampton, and reached the elevation of 37,000 feet, or 7 miles, which far exceeds the height hitherto attained by any other aerial voyagers. But the daring excursionists were for a time in great peril, Mr. Glaisher having been insensible for seven minutes, and Mr. Coxwell having his hands so severely frozen that he was unable to pull the valve for descent with them, and was compelled to use his teeth.—All the features of the balloon as now used are more or less due to Professor Charles, already mentioned. The balloon is a large pear-shaped bag, made of pliable silk cloth, covered with a varnish of caoutchouc dissolved in oil of turpentine to render it air-tight. The ordinary size of the bag ranges from 20 to 30 feet in equatorial diameter, with a proportionate height, but a balloon of 100 feet in diameter and 130 feet in height has been constructed. A car, generally of wicker-work, supported by a network which extends over the balloon, contains the aeronaut; and a valve, usually placed at the top, to which is attached a string reaching the car, gives him the power of allowing the gas to escape, whereby the balloon is lowered at pleasure. The problem of how to steer or propel a balloon in a desired horizontal direction can scarcely be said to have been satisfactorily solved. Balloons of a fish or cigar shape, floated by gas, propelled by a screw driven by a dynamo-electric machine, and steered by a large rudder, made several ascents in Paris in 1884 and 1885, and it is claimed for them that they have settled the question of the practicability of aerial navigation. Balloons have been used for taking both meteorological and military observations with considerable success. During the siege of Paris in 1870-71 over sixty persons (including Gambetta) and innumerable letters left the city in balloons. Recent experiments have been directed to flying machines, and to dirigible kites by Lieut. Wise of the U. S. army. See *Flying Machines*.

Aerostatic Press, a simple contrivance for rendering the pressure of the atmosphere available for extracting the coloring matter from dye-woods, and similar purposes. A

horizontal partition divides the machine into two parts. The lower part is connected with an air-pump, by means of which the air can be withdrawn from it. The matter from which the substance is to be extracted is laid upon the partition, which is perforated, and a perforated cover is placed over it. Upon this the liquid intended to form the extract is poured, and, the pump being worked, the air is extracted from the lower vessel, and by the pressure of the atmosphere the liquid is forced through the intervening mass, carrying the color or other soluble matter with it.

Æschines (ēs'ki-nēz), (390-314 B. C.) a celebrated Athenian orator, the rival and opponent of Demosthenes. He headed the Macedonian party in Greece, or those in favor of an alliance with Philip, while Demosthenes took the opposite side. Having failed in B. C. 330 in a prosecution against Ctesiphon for proposing to bestow a crown of gold upon Demosthenes for his services to the state (whence the oration of Demosthenes *On the Crown*) he withdrew from Athens. Latterly he established a school of eloquence at Rhodes.

Æschylus (524-456 B. C.), the earliest of the three great writers of Greek tragedy.—He was of noble family, and probably a descendant of Codrus, the last king of Athens. His father was probably connected with the worship of Ceres, and Æschylus himself was early familiar with the Eleusinian Mysteries, strange religious rites into which he was afterward initiated. Æschylus's life was active, not only in the field of dramatic poetry, but on the battle-field in defence of Athens against the invaders. For distinguished valor at Marathon (490) he, with his two brothers, received public honors. At Salamis (480) Æschylus also fought. Æschylus began his career as a poet at the age of 25. In 471 he gained the prize for a trilogy. In the latter part of his life he was defeated by Simonides in the contest for a prize offered for the best elegy on those who fell at Marathon. Æschylus spent most, and perhaps all, of his remaining years in Sicily, where he was well received, and died there.—Of Æschylus's 70 dramas but seven are preserved, in addition to a few fragments. Of these the *Prometheus* is perhaps the best known to English readers through Mrs. Browning's poetical version. Æschylus has given an original portrayal to the story, making Prometheus's awful fate appear as the just result of his wilful self-assertion. In the *Agamemnon* is beautifully told the story of Clytemnestra's crime. He caused the first stage to be erected, and was the first to provide appropriate scenery and costumes. In style, the tragedies of Æschylus are grand and somber, and in their intensity they sometimes surpass even Shakespeare. Like this poet Æschylus drew his material largely from myths and legends. Some are historical in character. The *Persæ* tells of the defeat of Xerxes and his host.

Æscula'pius, the god of medicine among the Greeks and latterly adopted by the Romans, usually said to have been a son of Apollo.

He is often represented with a large beard, holding a knotty staff, round which is entwined a serpent, the serpent being specially his symbol.

Æsop, the Greek fabulist, is said to have been a contemporary of Cræsus and Solon, and thus probably lived about the middle of the sixth century B. C. He visited the court of Cræsus, and is also said to have visited Pisistratus at Athens. Finally he was sent by Cræsus to Delphi to distribute a sum of money to each of the citizens. For some reason he refused to distribute the money, whereupon the Delphians, enraged, threw him from a precipice, and killed him. In modern times several collections purporting to be Æsop's fables have been published.

Æsthet'ics, the philosophy of the beautiful; the name given to the branch of philosophy or of science which is concerned with that class of emotions, or with those attributes, real or apparent, of objects generally comprehended under the term *beauty*, and other related expressions. Baumgarten (1714-1762), a German philosopher, was the first modern writer to treat systematically on the subject. Socrates, according to Xenophon, regarded the beautiful as coincident with the good, and both as resolvable into the useful. Plato, in accordance with his idealistic theory, held the existence of an absolute beauty, which is the ground of beauty in all things. He also asserted the intimate union of the good, the beautiful, and the true. In his treatises on Poetry and Rhetoric Aristotle lays down a theory of art, and establishes principles of beauty. His philosophical views were in many respects opposed to those of Plato. He does not admit an absolute conception of the beautiful; but he distinguishes beauty from the good, the useful, the fit, and the necessary. A distinction of beauty, according to him, is the absence of lust or desire in the pleasure it excites. Beauty has no utilitarian or ethical object; the aim of art is merely to give immediate pleasure; its essence is imitation. Plotinus agrees with Plato, and disagrees with Aristotle, in holding that beauty may subsist in single and simple objects, and consequently in restoring the absolute conception of beauty. He differs from Plato and Aristotle in raising art above nature. Baumgarten's treatment of aesthetics is essentially Platonic. He made the division of philosophy into logic, ethics, and aesthetics; the first dealing with knowledge, the second with action (will and desire), the third with beauty. He limits aesthetics to the conceptions derived from the senses, and makes them consist in confused or obscured conceptions, in contradistinction to logical knowledge, which consists in clear conceptions. Kant defines beauty in reference to his four categories—quantity, quality, relation, and modality. In accordance with the subjective character of his system, he denies an absolute conception of beauty, but his detailed treatment of the subject is inconsistent with the denial. Thus he attributes a beauty to single colors and tones, not on any plea of complexity, but on the ground of pu-

rity. He holds also that the highest meaning of beauty is to symbolize moral good, and arbitrarily attaches moral character to the seven primary colors. The value of art is mediate, and the beauty of art is inferior to that of nature. The treatment of beauty in the systems of Schelling and Hegel could with difficulty be made comprehensible without a detailed reference to the principles of these remarkable speculations. English writers on beauty are numerous, but they rarely ascend to the heights of German speculation. Shaftesbury adopted the notion that beauty is perceived by a special internal sense; in which he was followed by Hutcheson, who held that beauty existed only in the perceiving mind, and not in the object. Numerous English writers, among whom the principal are Alison and Jeffrey, have supported the theory that the source of beauty is to be found in association—a theory analogous to that which places morality in sympathy. Dugald Stewart attempted to show that there is no common quality in the beautiful beyond that of producing a certain refined pleasure; and Bain agrees with this criticism, but endeavors to restrict the beautiful within a group of emotions chiefly excited by association or combination of simpler elementary feelings. Herbert Spencer has a theory of beauty which is subservient to the theory of evolution. He makes beauty consist in the play of the higher powers of perception and emotion, defined as an activity not directly subservient to any processes conducive to life, but being gratifications sought for themselves alone. He classifies æsthetic pleasures according to the complexity of the emotions excited, or the number of powers duly exercised; and he attributes the depth and apparent vagueness of musical emotions to associations with vocal tones built up during vast ages. Among numerous writers who have made valuable contributions to the scientific discussion of aesthetics may be mentioned Winckelmann, Lessing, Richter, the Schlegels, Gervinus, Helmholtz, and Ruskin.

Ætna, (or Etna) Mount, the greatest volcano in Europe, in the province of Catania in Sicily; height, 10,874 feet. It rises immediately from the sea, has a circumference of more than 100 miles, and dominates the whole northeast part of Sicily, having a number of towns on its lower slopes. The top is covered with perpetual snow; midway down is the woody or forest region; at the foot is a region of orchards, vineyards, olive groves, etc. Ætna thus presents the variety of climates common to high mountains in lower latitudes, oranges and lemons and other fruits growing at the foot, the vine rather higher up, then oaks, chestnuts, beeches, and pines, while on the loftiest or desert region vegetation is of quite a stunted character. A more or less distinct margin of cliff separates the mountain proper from the surrounding plain; and the whole mass seems formed of a series of superimposed mountains, the terminal volcano being surrounded by a number of cones, all of volcanic origin, and nearly 100 of which are of consid-

Ætolia

erable size. The different aspects of the mountain present an astonishing variety of features—woods, forests, pastures, cultivated fields, bare rocky precipices, streams of lava, masses of ashes and scoriae, as also picturesque towns and villages. From the summit the view presents a splendid panorama, embracing the whole of Sicily, the Lipari Islands, Malta, and Calabria. The eruptions of Ætna have been numerous, and many of them destructive. That of 1169 overwhelmed Catania and buried 15,000 persons in the ruins. In 1669 the lava spread over the country for forty days, and 10,000 persons are estimated to have perished. In 1693 there was an earthquake during the eruption, when over 60,000 lives were lost. One eruption was in 1755, the year of the Lisbon earthquake. Among more recent eruptions are those of 1832, 1865, 1874, 1879. An eruption is ordinarily preceded by premonitory symptoms of longer or shorter duration. The population of the district of Ætna is about 300,000.

Æto'lia, a western division of northern Greece. The inhabitants are little heard of in Greek history till the Peloponnesian war, at which time they were notorious among the Greeks for the rudeness of their manners.

Affida'vit, a written statement of facts upon oath or affirmation. Affidavits are generally made use of when evidence is to be laid before a judge or a court, while evidence brought before a jury is delivered orally. The person making the affidavit signs his name at the bottom of it, and swears that the statements contained in it are true. The affidavit may be sworn to in open court, or before a magistrate or other duly qualified person.

Affin'ity, in chemistry, the force by which unlike kinds of matter combine so intimately that the properties of the constituents are lost, and a compound with new properties is produced. The usual effect of increase of temperature is to diminish affinity and ultimately to cause the separation of a compound into its constituents. Where two elements combine to form a compound, heat is almost always evolved, and the amount evolved serves as a measure of the affinity. In order that chemical affinity may come into play it is necessary that the substances should be in contact, and usually one of them at least is a fluid or a gas. Color, taste, and smell are changed, destroyed, or created; harmless constituents produce strong poisons; strong poisons produce harmless compounds.

Affin'ity, the relationship, imputed by reason of marriage, between the husband or wife and the kindred by blood of the other. Thus the wife's kindred bear the same relation by affinity to the husband that they bear to her by consanguinity. Affinity also exists between the husband and one who is connected by marriage with the blood relations of the wife, as in the case of two men who were married to sisters. It constitutes a disqualification of judges or jurors equally with consanguinity. In England, under the statute 32 Henry VIII, it was held that affinity was an

Afghanistan

impediment to marriage to the same extent as consanguinity; and hence arose the rule of the English law that a man may not marry his deceased wife's sister.

Afghanistan (ăf-găn'i-stăn), a country in Asia. In part the boundaries are not well defined, but recently that from the Oxus to the Persian frontier has been surveyed and marked by boundary stones by a joint Russian and British commission. The area may be set down at about 280,000 sq. mi. The population according to the census of 1901, is 4,000,000. Afghanistan consists chiefly of lofty, bare, uninhabited tablelands, sandy, barren plains, ranges of snow-covered mountains, offsets of the Hindu Kush or the Himalayas, and deep ravines and valleys. Many of the last are well watered and very fertile, but about four fifths of the whole surface is rocky, mountainous, and unproductive. The surface on the northeast is covered with lofty ranges belonging to the Hindu Kush, whose heights are often 18,000 and sometimes reach perhaps 25,000 feet. The northeastern portion of the country has a general elevation of over 6,000 feet; but toward the southwest, the general elevation declines to about 1,000 feet. The interior mountains reach the height of 15,000 feet. Great part of the frontier toward India consists of the Suleiman range, 12,000 feet high. There are numerous avenues of communication between Afghanistan and India, such as the Khyber Pass, the Gomul Pass, and the Bolan Pass. The largest river is the Helmund, 400 miles long. The climate is extremely cold in the higher, and intensely hot in the lower regions. The most common trees are pines, oaks, birch, and walnut. In the valleys fruits in the greatest variety and abundance, grow wild. The principal crops are wheat, barley, rice, maize, tobacco, sugarcane, and cotton. The chief domestic animals are the dromedary, the horse, ass, and mule, the ox, sheep, and goat; of wild animals, there are the tiger, bears, leopards, wolves, jackal, hyena, foxes, etc. The chief towns are Cabul (the capital), Kandahar, Ghuzni, and Herat. The Afghans proper form the great mass of the people. They are allied in blood to the Persians, and are divided into a number of tribes, among which the Duranis and Ghiljis are the most important. The Afghans are bold, hardy, and warlike, of a restless, turbulent temper, and much given to plunder. Tribal dissensions are constantly in existence. Their language is distinct from the Persian, though it contains a great number of Persian words, and is written with the Arabic characters. In religion they are Mohammedans of the Sunnite sect.

The history of Afghanistan belongs almost to modern times. In 1738 the country was conquered by the Persians. About 1825 Dost Mohammed, the ruler of Cabul, acquired a preponderating influence in the country. In 1839, a British army entered Afghanistan, occupied Cabul, and placed Shah Shuja, a former ruler, on the throne. The Afghans organized a widespread insurrection in 1841,

Africa

when a number of British officers, women, and children were murdered. In January, 1842, the British left Cabul. In a few months Gen. Pollock, with a fresh army from India, retook Cabul and soon finished the war. Shah Shuja having been assassinated, Dost Mohammed again obtained the throne of Cabul, and acquired extensive power in Afghanistan. He died in 1863, having nominated his son Shere Ali his successor. Shere Ali entered into friendly relations with the British, but in 1878 war was declared against him, and the British troops entered Afghanistan. The ameer fled to Turkestan, where he soon after died; and his son Yakoub Khan, having succeeded him, concluded a treaty with the British in 1879, in which extension of the British frontier, the control by Britain of the foreign policy, and the residence of a British envoy in Cabul, were the chief stipulations. In 1880 Abdur-Rahman, a grandson of Dost Mohammed, was recognized by Britain as emir of the country, and has since been on friendly terms with the British, by whom he is subsidized. Recent encroachments by the Russians on territory claimed by Afghanistan almost brought about a rupture between Britain and Russia in 1885. Abdur-Rahman died Oct. 3, 1901. His son, Habibulla Kahn, now ameer, is considered a worthy successor.

Africa, the second in size of the great divisions of the globe, lies in the eastern hemisphere. Its greatest length is about 5,000 miles, its greatest breadth 4,700, its area is 11,525,810 sq. mi., and its coast-line 15,000 miles. A. is shaped like an irregular triangle, having its vertex to the south, and is bounded n. by the Mediterranean, e. by the Red Sea and Indian Ocean, and w. by the Atlantic Ocean. It is joined to Asia by a narrow neck of land, which, however, has been cut through by the Suez Canal. There are few large gulfs and bays; the most important are the gulfs of Sidra and Kabes (the greater and lesser Syrtes) on the n.; Suez, Aden, and Delagoa Bay on the e.; Algoa Bay on the s.; and the Gulf of Guinea on the w. The principal capes are Bon on the n.; Guardafui on the e.; Good Hope on the s.; and Verd on the w. The islands belonging to Africa are not numerous, and except Madagascar, none of them are large. They include Madeira, the Canaries, Cape Verd Islands, Fernando Po, Prince's Island, St. Thomas, Ascension, St. Helena, Mauritius, Bourbon, the Comoros, Socotra, etc.

Political Divisions.—The political map of Africa, during the past few years, has undergone considerable modifications, due partly to wars and revolts in the extreme south and northeast, but mainly to the rapid progress of explorations, which has reawakened the interest of European nations in this continent. A fresh stimulus was thus given to the desire of appropriating the territory still unoccupied in this region, with the result that at present nearly three-fourths of Africa is under the direct or indirect control of seven European states—Great Britain, France, Portugal, Spain, Germany, Italy, and Turkey. The rest is

Africa

either comprised in more or less clearly defined independent empires and kingdoms, and held by unruly hordes, or by savage people still in the tribal state.

The principal political divisions of Africa are as follows:

Independent states: Abyssinia, Congo Free State, and Morocco.

Quasi-independent states: Egypt and British Soudan. While these maintain governments nominally subject to Turkey, they are practically under British rule. There are also many petty kingdoms in the colonial possessions of European powers.

British colonies: Basutoland, Bechuanaland Protectorate, British Central Africa Protectorate, British East Africa, Cape Colony, Gambia, Gold Coast, Lagos, Mashonaland, Matedeleland, Natal, Niger Coast Protectorate, Nigeria, Orange River Colony, Rhodesia, Sierra Leona, Somali Coast Protectorate, Transvaal, Uganda, Walfish Bay, Zanzibar, Zululand. Total area 3,031,084 sq. m.; total population 42,647,761. The Niger territories are governed by the Royal Niger Company under a charter issued in July, 1886.

French colonies: Algeria, Algerian Sahara, Dahomey, French Congo, French Guinea, French Soudan, Ivory Coast, Sahara, Senegal, Somali Coast and Obock, Tunis, Wadai. Total area 3,260,814 sq. m.; total population, 31,682,000.

German colonies: Cameroon, German East Africa, German Southwest Africa, Togoland. Total area 930,760 sq. m.; total population 14,200,000.

Portuguese colonies: Angola, Portuguese East Africa, Portuguese Guinea. Total area 790,240 sq. m.; total population 8,059,000.

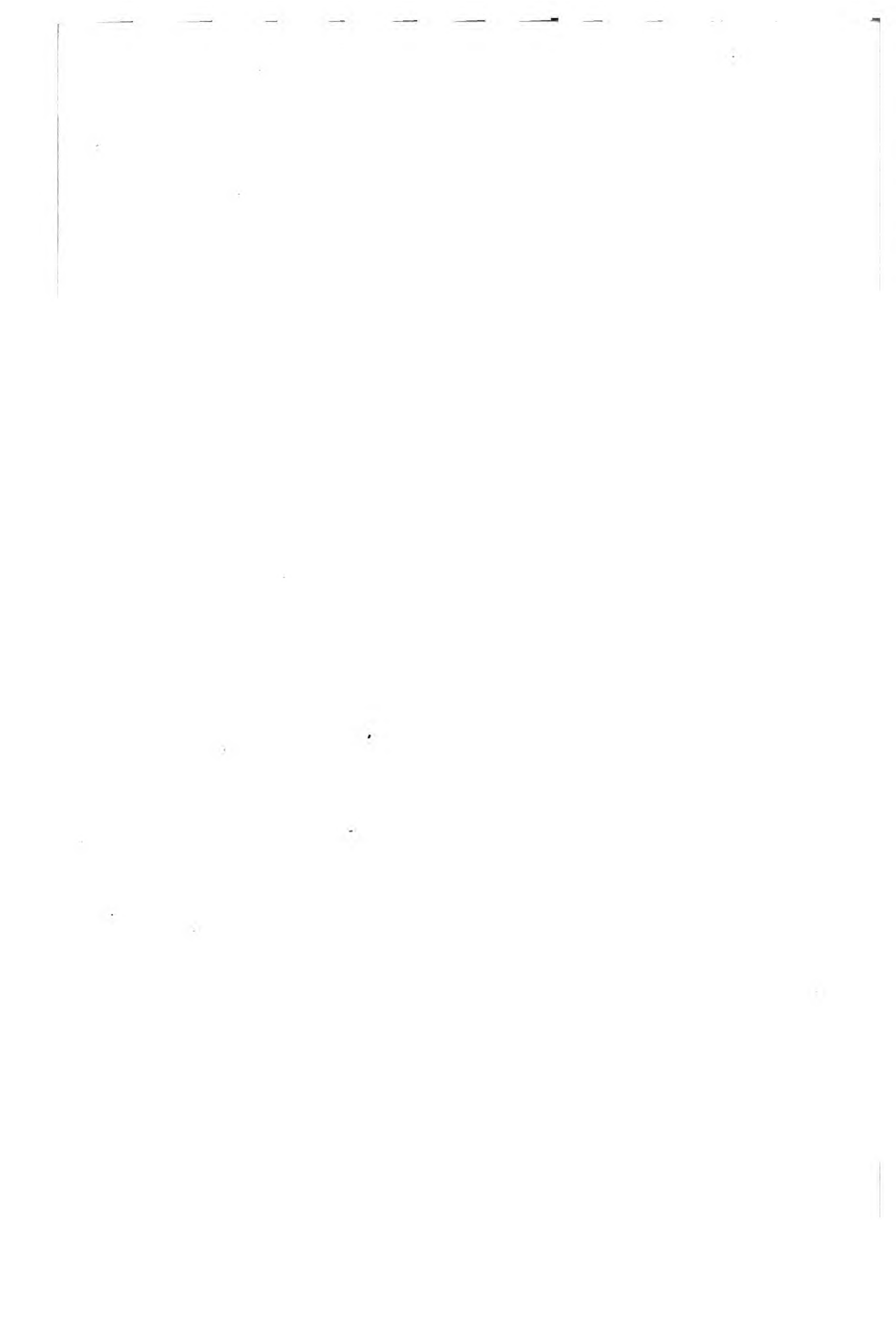
Italian colonies: Eritrea, Somaliland. Total area 188,500 sq. m.; total population 950,000.

Spanish colonies: Rio d'Oro, Spanish Congo. Total area 244,000 sq. m.; total population 107,000.

Turkish colonies not mentioned above: Tripoli, including Benghazi. Area 398,900; population 1,300,000.

Total area of Africa 11,803,948 sq. m.; total population 158,699,761.

Surface, Rivers, and Lakes.—The most striking feature of northern Africa is the immense tract known as the Sahara, or Great Desert, which is inclosed on the north by the Atlas Mountains (greatest height, 12,000 to 13,000 feet), the plateau of Barbary and that of Barca, on the east by the mountains along the west coast of the Red Sea, on the west by the Atlantic Ocean, and on the south by the Soudan. The Sahara is by no means the sea of sand it has sometimes been represented: it contains elevated plateaux and even mountains radiating in all directions, with habitable valleys between. A considerable nomadic population is scattered over the habitable parts, and in the more favored regions there are settled communities. The Soudan, which lies to the south of the Sahara, and separates it from the more elevated plateau of Southern Africa, forms a belt of pastoral country across





TYPES OF AFRICAN RACES. 1. Ashanti. 2. Negress of Loango. 3. Kamerunian. 4. Baluban with
 10. Akka 11. Zulu. 12. Massai. 13. Wanganda (Ugandai). 14. Darfur-Negro. 15. Haussanian. 16, 17. Bushman, E



5. 18. 9. Somali. 10. Eissa-Somali. 6. Abyssinian Woman. 7. Howa. 8. Terorian Woman. 9. Ovambo.
 1. Wife. 13. Natchapa. 17. Niamniam. 20. Dinka.



TYPES OF AFRICAN RACES. 1. Ashanti. 2. Negress of Loango. 3. Kameronian. 4. Baluban. 5. 10. Akka. 11. Zulu. 12. Massai. 13. Wanganda (Ugandai). 14. Darfur-Negro. 15. Haussanian. 16. 17. Bushman.



amental scars. 5. Somali, Eissa-Somali. 6. Abyssinian Woman. 7. Howa. 8. Herorian Woman. 9. Ovambo. 10. Namaqua. 11. Niamniam. 12. Dinka. 13. Namaqua. 14. Niamniam. 15. Dinka. 16. Namaqua. 17. Niamniam. 18. Dinka. 19. Namaqua. 20. Niamniam.





Tamarind.



Dagussa.



Kola.



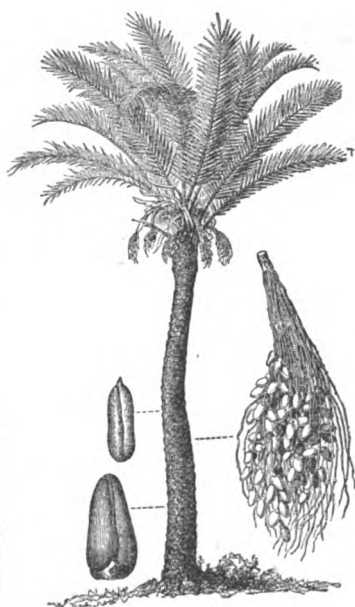
Acacia.



Koussou.]



Indigo.]



Date palm.



Doum palm.



Oil palm.

Africa

Africa, and includes the countries on the Niger, around Lake Tchad (or Chad), and eastward to the elevated region of Abyssinia. Southern Africa as a whole is much more fertile and well watered than Northern Africa, though it also has a desert tract of considerable extent (the Kalahari Desert). The mountains which inclose Southern Africa are mostly much higher on the east than on the west, the most northerly of the former being those of Abyssinia, with heights of 10,000 to 14,000 or 16,000 feet, while the eastern edge of the Abyssinian plateau presents a steep unbroken line of 7,000 feet in height for many hundred miles. Farther south, and between the great lakes and the Indian Ocean, we find Mounts Kenia and Kilimanjaro (19,500 feet), the loftiest in Africa, covered with perpetual snow. Of the continuation of this mountain boundary we shall only mention the Drakenberg Mountains, which stretch to the southern extremity of the continent, reaching in Cathkin Peak, Natal, the height of over 10,000 feet. Of the mountains that form the western border the highest are the Cameroon Mountains, which rise to a height of 13,000 feet, at the inner angle of the Gulf of Guinea. The average elevation of the southern plateau is probably from 3,000 to 4,000 feet.

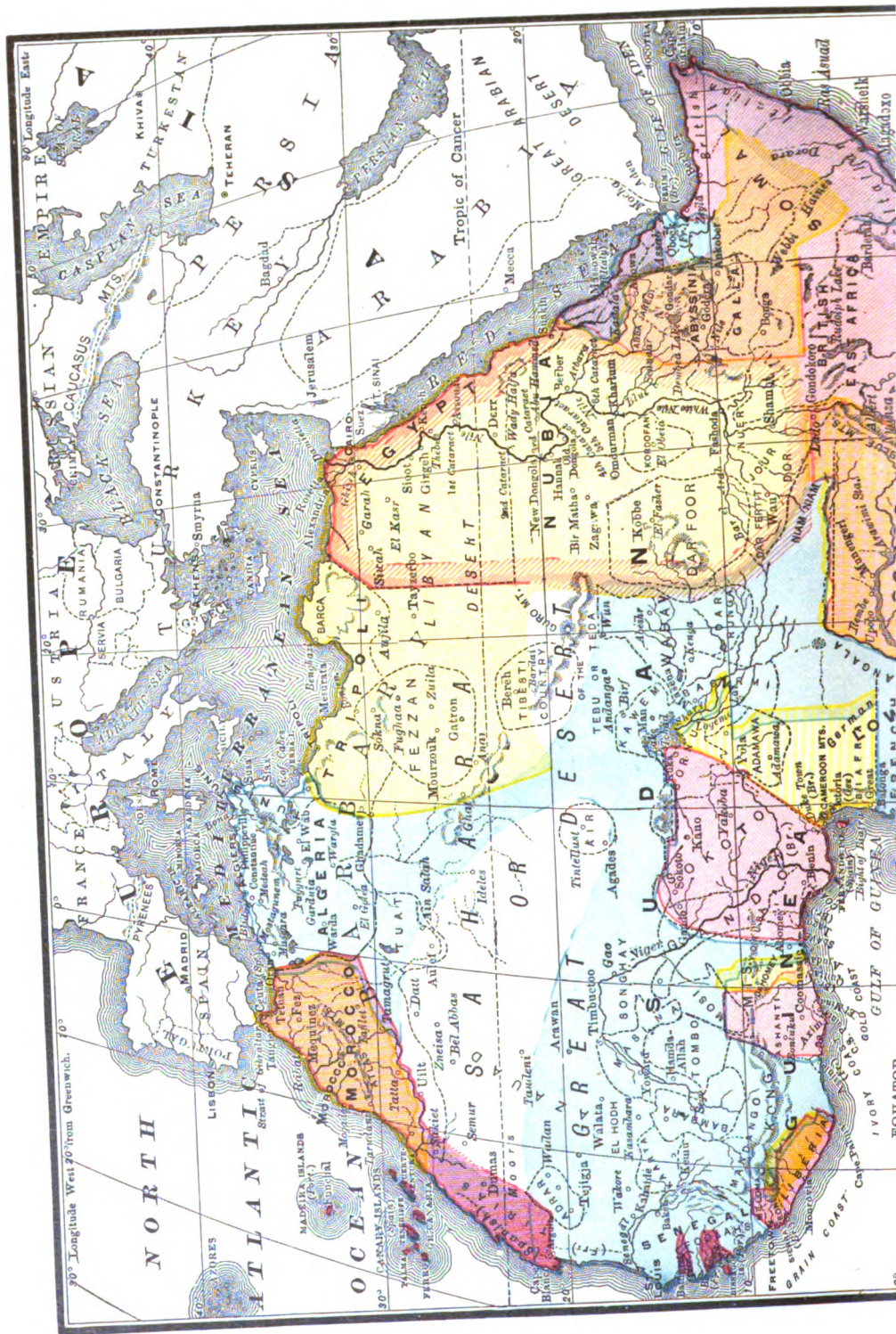
In respect to the river systems of Africa there is a certain symmetry. The two great southern basins of the Congo and Zambezi balance those of the Nile and Niger on the north, and the Orange and Limpopo in the extreme south correspond with the Senegal and Draa of the northwest. The Zambezi, Limpopo, Rovuma, Juba, and a few other coast streams flow into the Indian Ocean. The Congo, Nile, Niger, Orange, Cuncne, Koamza, Ogo-way, Volta, Cambaia, Tensife, Muluya, and Majerdah flow into the Atlantic directly or through the Mediterranean. Nearly all of these rivers have falls or rapids such as the Victoria Falls in the Zambezi, the Yellala and Isangulia and Stanley Falls on the Congo, the so-called six cataracts, the Ripon, the Merchison and others on the Nile, the Hundred Falls on the Middle Orange. The principal lakes of Africa are Nyassa, Tanganyika, Alexandria Nyanza, Victoria Nyanza, Mwtan Nzige, Albert Nyanza, Victoria (next to Lake Superior the largest fresh water basin on the globe). In the equatorial lake region are Lake Psad, Ngani, Tana.

Geology.—In its geological constitution, Africa gives the appearance of great stability and antiquity. The seaboard is subject to scarcely any movements of upheaval or subsidence, except on the n. e. coast between the Nile delta and the Gulf of Sidra, and parts of the Moroccan and Red Sea coasts. Earthquakes are confined mainly to the Atlas, and igneous disturbances are restricted on the west side to the Bight of Biafra. On the east side, the volcanic system is much more highly developed, stretching from the Comoro Islands through Masai Land (Kilima-Njaro, Kenia, Elgon, etc.), northward to the Danakil country, and the volcanic islets in the Red Sea.

Africa

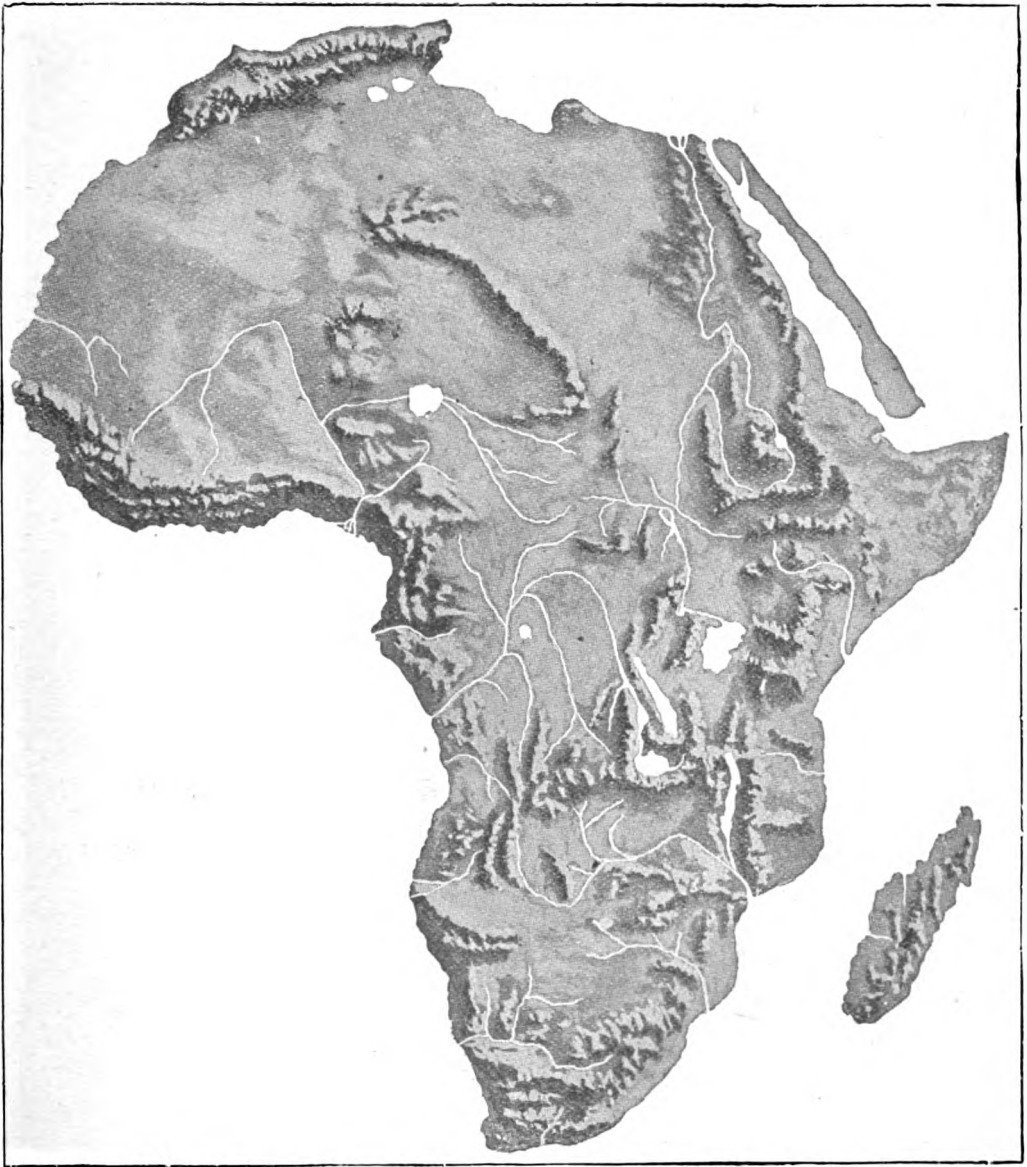
The lava-fields of the Masai plateau present signs of recent activity. The old plutonic and recent eruptive rocks appear to be generally intermingled, and largely associated with semi-crystalline and metamorphic forms, such as the schists, gneisses, graywackes, and hornblendes, about Kilima-Njaro and many other places. Shales and flaggy sandstones form the geological basis of the East African carboniferous series, which extends in a narrow strip from near the equator continuously to the Cape. Hard granite forms the bed of the Orange River, and asbestos, soapstone, coal, iron, and copper were among the specimens collected by Farini in the Kalahari steppe. Metamorphic rocks, again, prevail in the Congo basin, where iron and copper ores also abound. Syenite, and other granites, with old sandstones, are the characteristic features of Upper Egypt and the Nubian steppe, while Abyssinia has also a granite base underlying dolerites, trachytes, and crystalline slates. A great diluvial plain stretches from this region through Senaar southward to the crystalline slates, associated with magnetic iron ores of the Baginze slopes, about the source of the Welle. The Sahara is characterized by the absence of late sedimentary rocks and marine fossils, and by the prevalence of old sandstones, quartz, and carboniferous limestones. It also abounds in rich saline deposits, forming a chief article of trade with the neighboring Soudan, which is distinguished by the almost total absence of salt, the prevailing formations here being crystalline rocks, granites, diorites, slates, gneiss, again associated with sandstones in the higher ranges. In the Kong uplands, the sandstones overlie the granites, which in the Teggele group (Kordofan) pass over to porphyries and syenites, with gneiss interspersed with extensive diorite and auriferous quartz veins. Gold, mined by the ancient Egyptians at Mount Elba, Red Sea coast, occurs also in many other places, as in Upper Guinea, the Lower Zambezi, and Transvaal; and gold dust has at all times formed a chief article of export. But iron and copper are the characteristic metals, iron ores abounding almost everywhere, and copper in Namaqualand, the Congo basin, Dar-Fertit, and many other places. The basin of the Vaal is one of the richest diamondiferous regions on the globe. In this southern region granites and crystalline slates form the substratum of a great series of fossiliferous rocks.

Climate.—The climate of Africa is mainly influenced by the fact that it lies almost entirely within the tropics. In the equatorial belt, both north and south, rain is abundant and vegetation very luxuriant, dense tropical forests prevailing for about 10° on either side of the line. To the north and south of the equatorial belt the rainfall diminishes, and the forest region is succeeded by an open pastoral and agricultural country. This is followed by the rainless regions of the Sahara on the north and the Kalahari Desert on the south, extending beyond the tropics, and bordering on the





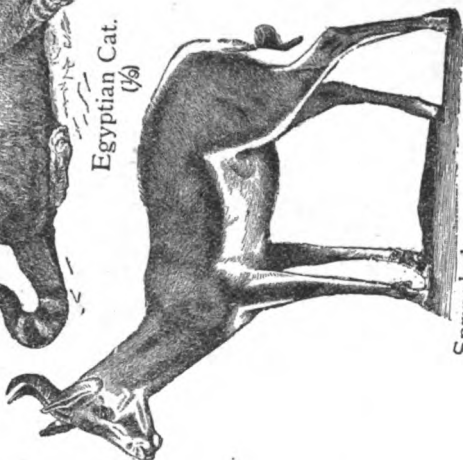




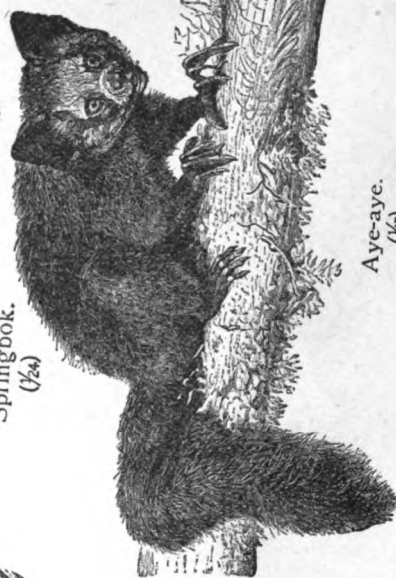
RELIEF MAP OF AFRICA.



Egyptian Cat.
($\frac{1}{3}$)



Springbok.
($\frac{1}{2}$)



Aye-aye.
($\frac{1}{3}$)



Egyptian Vulture.
($\frac{1}{3}$)



Lemur.
($\frac{1}{4}$)



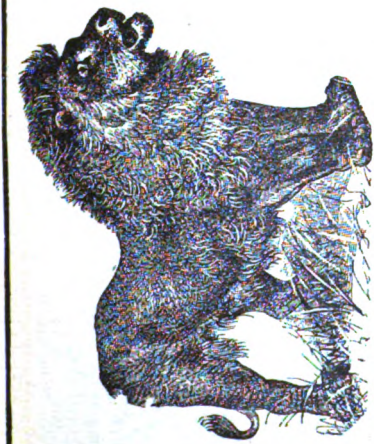
Dog-faced Baboon.
($\frac{1}{2}$)



Hoopoe.
($\frac{1}{3}$)



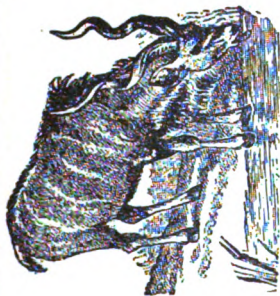
Dromedary.
($\frac{1}{2}$)



Lion.



Termite



Koodoo.



Zebra.



Gazelle.



Cape Buffalo.



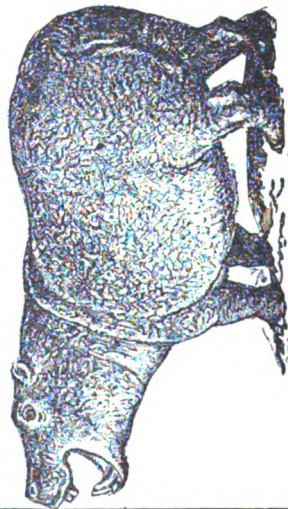
Tsetse.



Giraffe.



Elephants.



Hippopotamus.

Africa

agricultural and pastoral countries of the north and south coasts, which lie entirely in the temperate zone. The low coast regions of Africa are almost everywhere unhealthy, the Atlantic coast within the tropics being the most fatal region to Europeans.

Vegetation.—About 41 per cent. of the surface of Africa is either desert, or under scrub, or otherwise absolutely waste, and 35 per cent. steppe, or nearly treeless grass-grown savannah, leaving only 24 per cent. for forest and arable lands. The continuous forest growths are confined mainly to the vast equatorial region between the Upper Zambezi and Soudan, and to some isolated tracts about the Abyssinian plateau, in the Moroccan Atlas, all along the Guinea coast, about the Middle Limpopo and Zambezi, and in parts of Masai Land and the Upper Nile basin. From Sierra Leone to the river Ogoway, along the coast, the one prevailing landscape is that of endless forest. This is, in fact, part of the forest region—the forest belt, which has a distinctive fauna and flora, and which extends eastward, near the equator, more than half way across Africa to Lake Victoria Nyanza and the western shores of Tanganyika. In the extreme north of Africa are found the olive, date, several kinds of oak, eucalyptus, halfa (exported for paper making) papyrus, lotus, and there have recently been introduced cereals, cotton and tobacco. In the Soudan and Guinea are the forest regions containing a magnificent baobab, the banana, butter-tree, ebony, oil palm, musanga, mangrove, ground nut, dragon tree, acacias, mimosas. In the cape region the vegetation consists mostly of shrubs, grasses, ferns, heathers.

Zoology.—Africa is the home of the largest members of the animal kingdom, and owing to the absence of great central mountain barriers they may be found in all regions without special modification of type. Among the carnivorous animals, the lion, the panther, hyena, leopard, fox, and jackal. The herbivorous animals are the elephant, rhinoceros, buffalo, giraffe, ostrich, hippopotamus, and crocodile. Several species of antelopes are also found. The monkey family is spread over the whole continent represented by numerous types such as the Babbaray variety, the dog-faced baboon, the Gallago lemur, the colobus, and the anthropoid chimpanzee and gorilla. Animals resembling the horse are the zebra, quagga, the pigmy Mauritanian ass, and the camel. Of the mammals there are about 500 species peculiar to this continent, of which about 50 are the antelope family. The birds found in Africa are the ostrich, secretary, ibis, guinea fowl, weaver bird, roller bird, love bird, wax bill, whidah, sun bird, parrot, quail, and others. The reptiles and insects are the huge python, many poisonous snakes, termites, locusts, the destructive Tsetse fly, and the donderobo.

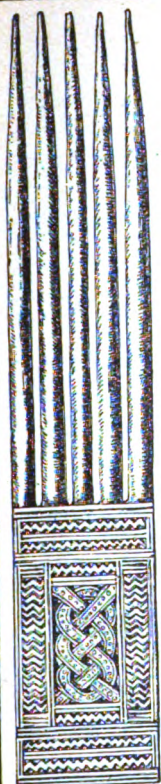
Population.—The population of A. is estimated at about 158,699,761. N. of the Soudan, the Berber race prevails from the Atlas Mountains to Libya; the Nubians are partly of Arab and partly of Negro origin, while the Copts of

Africa

Egypt belong probably to the Semitic family, but the frequent conquests and colonizations of the n. African seaboard both in early and later times have complicated the question of race. Turks are numerous in Tunis, Tripoli, and Egypt. The middle of A. is peopled almost entirely by the Ethiopian or Negro family, and the s. is occupied by the Hottentots and Kafirs—members probably of the same great family. There are about 1,110,000 Europeans (immigrants or descendants of immigrants); 448,000 in northern Africa, 640,000 in southern Africa, and 22,000 within the Tropics. Nearly one-half of the population of Africa are Mohammedans. Christianity is found among the Europeans, and, in a corrupt form, in Abyssinia. It embraces about 9,000,000 people. There are about 1,000,000 Jews. The remaining portions are heathen, following varieties of fetishism, etc.

Products.—Africa has a great variety of products common to temperate, semi-tropical, and tropical latitudes. The countries north of the Sahara produce semi-tropical fruits, wheat, corn, rice, wines, cotton, sugar, and large quantities of garden vegetables. The tropical regions have not been developed, but tropical fruits, gums, ivory, and rubber are found in abundance in the native state, and the great forests of the Congo basin contain varieties of wood suitable for all purposes for which lumber is used. When cheaper transportation facilities are provided, this lumber will find its way to the markets of Europe. The temperate regions in the southern part of the continent are suited to grazing as well as to the growing of crops, and large herds of cattle, sheep and goats, and horses constitute a good portion of the wealth of the farmers of this section. The mineral products of Africa have so far been the most valuable of all. Coal and iron are found in considerable quantities, but the gold and diamond regions of South Africa are the richest in the world. The diamond mines near Kimberly, in the northern part of Cape Colony, were opened in 1868 and 1869, and it is estimated that diamonds exceeding \$350,000,000 in value in the rough have been taken from them. Until the Boer war compelled these mines to suspend operation, they produced over 98 per cent of the world's output. The gold mines near Johannesburg were opened in 1883, and the value of their output increased from \$5,000,000 to \$55,000,000 a year. More than \$3,000,000 worth of gold was taken from these mines before they were closed by the war.

Commerce.—Trade with foreign nations has increased rapidly within the last decade. The Mediterranean countries have a good trade with the countries of southern Europe, exporting farm and garden products, also ostrich feathers, ivory, gold dust, and leather, all obtained by caravan trade with the Soudan. They import tools, textiles, and lumber. The trade of Central Africa is carried on almost wholly with Great Britain, France, and Belgium. The exports are coffee, gum copal (from which varnish is made), ivory, and rub-



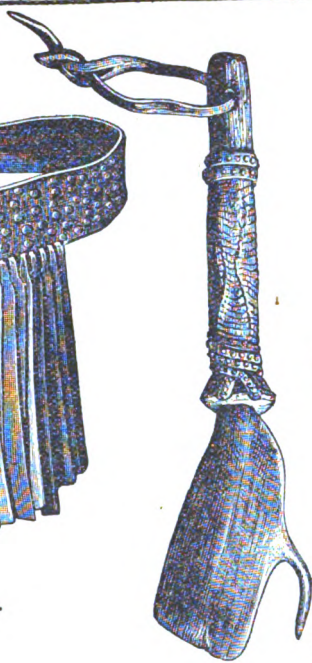
Ornamental Comb.



Woman's Apron.



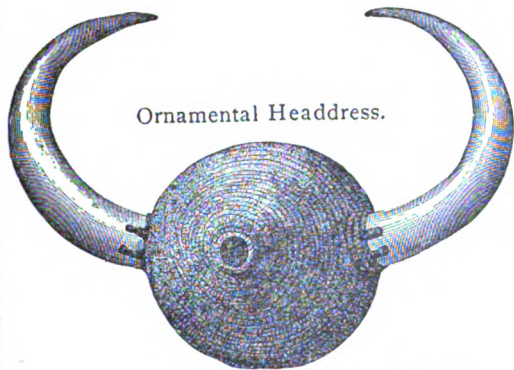
Amulet.



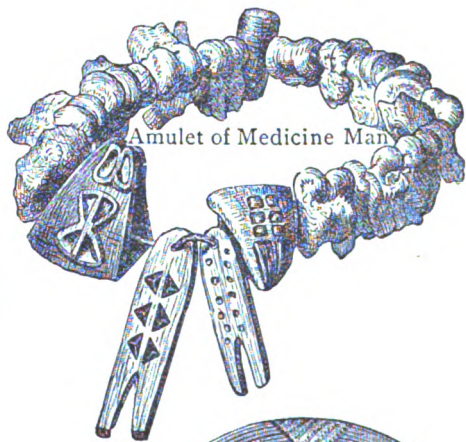
Iron Missile.



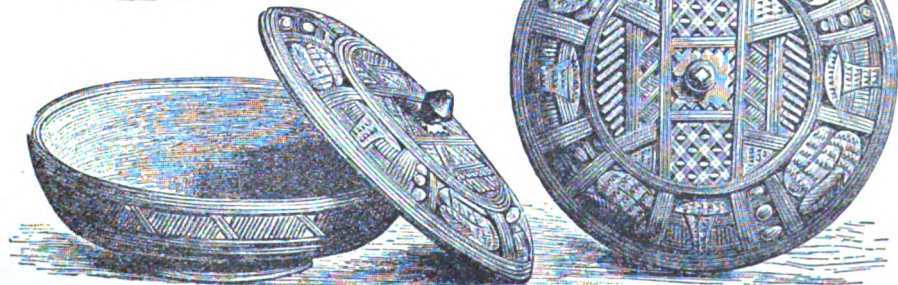
Dagger in Sheath.



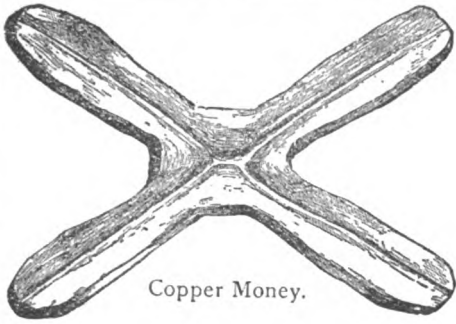
Ornamental Headdress.



Amulet of Medicine Man



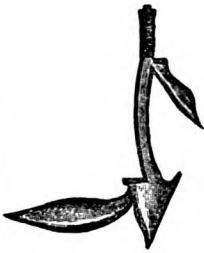
Wooden Vessel and Cover.



Copper Money.



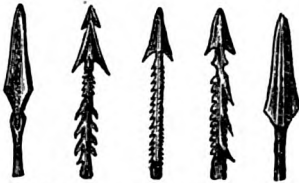
Iron Money.



Iron Missiles.



Clay Pipe Bowl.



Iron Spear Heads.



Leather Pillow.



Leather Pillow-case.



Dagger Blade.



Bow Holder.



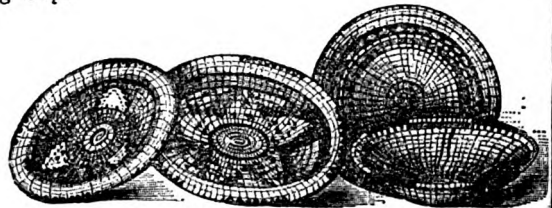
Sandals.



Drinking Cup.



Dirk with Sheath.



Covers for Dishes.

Africa

ber. The Congo Free State is one of the principal sources of rubber in the world. The imports are textiles, tools, and some machinery. Though the slave trade is prohibited, it is still carried on surreptitiously to a limited extent, Arabs from the Soudan being the principal instigators of the traffic. The colonies of South Africa have most of their trade with Great Britain. The exports are wool, ostrich feathers, hides, and gold and diamonds. The total trade for Africa, according to the latest available statistics, 1899, shows the following results: Exports, \$345,773,454; imports, \$395,296,552. In 1900 the trade of the United States with Africa was: Exports, \$22,979,170; imports, \$11,025,306.

Communication.—Railway construction is receiving much attention, and is one of the most important means of partitioning and colonizing the continent. Lines of railway having a total mileage of 11,575 miles are already constructed, and numerous others are projected and under way. (See *Cape-to-Cairo Railway*). Algeria, Tunis, and Egypt, in the north, and British South Africa, in the south, are the best equipped with railways. There is also an important line leading from the coast to the head of the rapids on the Lower Congo. The principal cities of the settled portions are connected by telegraph, and the stations in the Congo Free State have telegraph and telephone communication. Alexandria, Cairo, Suez, and Cape Town have cable connection with Europe. More than a hundred steamers ply regularly between the stations on the Congo and its tributaries, and lines of steamers on Lakes Nyassa, Tanganyika, and Victoria.

History.—The Phenicians are known to have formed establishments on the northern coast of A., probably not less than 3,000 years ago; and the conquest of Egypt by Cambyzes dates as far back as the year B. C. 525. The coasts of Egypt, of the Red Sea, and of the Mediterranean, were well known to the ancient Asiatics, who were constantly passing the narrow isthmus which divided their country from Africa. But whether they were acquainted with the western coast, and the eastern coast washed by the Indian Ocean, has not yet been satisfactorily answered. Egypt, under the Ptolemies, possessing the advantage of the only great river which falls from the continent into the Mediterranean, made no progress beyond its ancient boundaries. The Romans, who subsequently possessed Egypt, extended their discoveries no further than Fezzan and the region of the Upper Nile.

The 15th century produced a new era in maritime discovery. The voyages of the Portuguese were the first to give anything like an accurate outline of the coasts, and to complete the circumnavigation of Africa.

With Mungo Park, strictly speaking, commences the era of unceasing endeavors to explore the interior. He proceeded in 1795 from the river Gambia on the west coast, to the Niger, traced this river as far as the town of Silla, determined the southern confines of the Sahara, and returned in 1797. In 1805 he em-

Africa

barked on a second journey in the same regions, which cost him his life.

Between 1847 and 1852 Doctors Krapf and Rebman traveled 100 leagues inland from the eastern coast, and discovered Kilima-Njaro and Mount Kenia, and heard of great lakes lying beyond. The London Geographical Society sent an expedition in that direction, under the command of Captains Burton and Speke. The result of their expedition was the discovery of Lake Tanganyika and the Victoria Nyanza.

David Livingstone's explorations began substantially in 1840, when he first went out to south Africa as a missionary; but it was not until 1849 that he crossed the great southern plateau, and discovered Lake N'gami. Between 1851 and 1854 he ascended the Zambezi River for several hundred miles, and crossing the interior westward, reached Loanda on the Atlantic coast. On this journey he discovered Victoria Falls. Returning to the Cape he made preparations for his last journey. He reached the Chambezi River, south of Tanganyika, in 1868. Livingstone traced this river through three lakes, and it was his belief that it was the true source of the Nile. We know it now to be the head waters of the Congo. In 1871 Henry M. Stanley, then a reporter on the New York *Herald*, was sent by his employer, James Gordon Bennett, to find Livingstone. He reached Zanzibar in January, 1871, organized a caravan, and started for Lake Tanganyika. In the following November he reached his destination and delivered supplies to Livingstone. Stanley remained with Livingstone four months, discovering the River Rusizi flowing into the north end of the lake. Stanley returned home, and Livingstone continued his explorations until May, 1873, when he died. In 1873 the Geographical Society of London resolved to continue Livingstone's explorations, and sent out Lieut. Cameron. His orders were to find Livingstone, if living, and place himself under his command. At Zanzibar he organized an expedition, marched westward, and reached Tabora, or Kazeh, where he heard of Livingstone's death. He found Livingstone's last journals and papers, and sent them home. In his further explorations he came to the conclusion, which subsequently was proved to be correct, that Tanganyika and the Lualaba did not belong to the Nile system, but to the Congo. In 1874 Henry M. Stanley was sent, at the expense of the New York *Herald* and the London *Telegraph*, to continue Livingstone's explorations. Organizing at Zanzibar, Stanley visited the mountains that separate the basin of the Indian Ocean from Tanganyika and the Nile. He discovered the most southern source of the Nile, and explored the rivers Livumba and Shimiyu. In the spring of 1875 he completely circumnavigated Victoria Nyanza, and surveyed its shores. Going south he discovered another large lake, the Muta Nzige, now known as Albert Edward Nyanza, and arrived at Ujiji on Lake Tanganyika. The river swept to the north, but following the stream, he descended

Africa

to the Atlantic, thus proving the Lualaba and the Congo to be identical. His travels had lasted three years. In 1879 Stanley was again sent out to Africa under the auspices of the International Association, at the head of which was the King of Belgium, for the purpose of founding the Congo Free State. Stations were established along the Congo River. Roads were built, and many of the affluents of the river were explored. The whole country is now being rapidly opened to trade. De Brazza, a French naval officer, made several expeditions in the equatorial region and on the Congo between 1878 and 1880. A Portuguese explorer, Maj. Serpa Pinto, crossed the continent from Benguela to the Zambezi in 1877 and 1878. In 1880 Joseph Thompson explored the region between Nyassa and Tanganyika, and in 1884 made a journey from Mombasa, by Kilima-Njaro and Mount Kenia, across Masai Land to Victoria Nyanza. In 1881-82 De Pogge and Lieut. Wissmann crossed the continent from west to east in twenty-three months. Other travelers in the various quarters of the Congo region were Dr. Junker, Mr. Grenfell, Capello and Ivens, and Dr. Oscar Wolf.

The reports of the wonderful fertility and resources of the great lake region of the Upper Nile stimulated the Khedive of Egypt to add all those provinces to his own. Gen. Gordon was appointed to rule over them. After the death of Gordon the Mahdists began to threaten Emin Bey, governor of Equatoria, or Emin Pasha, as he was then known, and he fell back from Lado south to Wadelai on the branch of the Nile which issues from Albert Nyanza. For months and months he heard nothing from Egypt, though he knew the Soudan was in rebellion, and that his own safety was threatened. In December, 1886, a relief expedition was organized, and the command of the expedition given to Henry M. Stanley. Recruiting a force at Zanzibar, Stanley carried it by steamer around the Cape to the Congo, and thence up that river to its junction with the Aruwimi, and then up the Aruwimi to Yambuya, 1,300 miles from the sea. This point was reached June 15, 1887. Dividing his command, he left the rear guard, under the command of Maj. Edmund Barttelot, and on June 28, with 389 men, plunged into the great African forest. The objective point was Kavalli, a village at the southern extremity of Albert Nyanza, distant 330 geographical miles from Yambuya, estimated at 550 English miles. For 160 days Stanley marched forward with his men through jungle and bush and forest. From two to ten miles a day was the rate of travel, so difficult was it to make a road through the jungle. They passed through many villages of hostile tribes and had many skirmishes with them. In this great forest dwell the Pygmies, or Wambutti dwarfs. December 5, they came out upon a beautiful grassy plain over which roamed buffaloes, antelopes, and other varieties of wild animals. Two miles to the east of where they emerged, a tall peak arose 4,600 feet above the sea,

Agaric Mineral

named by Stanley, Mount Pisgah. A range of mountains lay farther eastward, at the foot of which rolled the Albert Nyanza, the objective point of the expedition. The natives were hostile, and several battles took place. On December 14 he reached Kavalli, but he could learn no word of Emin, who was still a twenty-five days' march off. On April 18, 1888, Stanley received a letter from Emin. On April 29 they met. After delivering a portion of supplies to Emin, Stanley turned back into the forest in quest of his rear guard. He found the remains of the rear guard at Yambuya in a terrible plight. Major Barttelot had been murdered, and all the European officers except Mr. Bonny, were gone. More than half of the force had deserted or were dead. Stanley led the remainder through the forest to Albert Nyanza. This great African forest stretches in unbroken density north and south 621 miles, with an average breadth of 517 miles. Innumerable insects swarm everywhere. Birds of many varieties inhabit the trees, while wild animals, all manner of reptiles, lemurs, chimpanzees, and baboons make their homes in its dark recesses. Added to these are the various tribes of the forest, among them the dwarfs.

In January, 1889, he succeeded in bringing his forces, or what remained of them, to Kavalli. Three months more were occupied in making preparations to escort Emin Pasha and his people to the sea-coast at Zanzibar. April 10 the caravan started from Albert Nyanza and, December 4 following, safely reached Bagamonya. This expedition of Stanley's leaves little to be discovered in Africa that is now absolutely unknown. All that remains to be done is detail, in the way of accurate measurements and observations. The origin and meaning of the name of this continent has been a fertile subject for conjecture. By the Greeks it was called Libya, and by the Romans, Africa. With respect to the word *Africa*, Suidas tells us that it was the proper name of that great city which the Romans called *Carthage*. For a full account of the Anglo-Boer war in South Africa, see *Transvaal*.

Agamem'non, son of Atreus, king of Mycenæ and Argos, brother of Menelaus, and commander of the allied Greeks at the siege of Troy. Returning home after the fall of Troy, he was treacherously assassinated by his wife, Clytemnestra, and her paramour, Ægisthus. He was the father of Orestes, Iphigenia, and Electra.

Aganippe (nîp'ê), a fountain on Mount Helicon, in Greece, sacred to the Muses, which had the property of inspiring with poetic fire whoever drank of it.

Agar'ic, a large and important genus of fungi. Over a thousand species are known, and are arranged in five sections according as the color of their spores is white, pink, brown, purple, or black. Many of the species are edible, like the common mushroom, and supply a delicious article of food, while others are poisonous.

Agaric Mineral, or Mountain-Meal, one of the purest of the carbonates of lime, found

Agasias

chiefly in the clefts of rocks and at the bottom of some lakes in a loose or semi-indurated form resembling a fungus. The name is also applied to a stone of loose consistence found in Tuscany, of which bricks may be made so light as to float in water, and of which the ancients are supposed to have made their floating bricks. It is a hydrated silicate of magnesium, mixed with lime, alumina, and a small quantity of iron.

Agasias, a Greek sculptor of Ephesus, about 400 B. C., whose celebrated statue, known as the Borghese Gladiator, representing a soldier contending with a horseman, is now in the Louvre, Paris.

Agassiz (ag'as-ē), ALEXANDER (1835—), son of Louis Agassiz, was born in Neuchâtel, Switzerland. He came to the U. S. in 1849, and graduated at Harvard in 1855. He was on the California Coast Survey, and was with his father in the museum of zoology at Cambridge, Mass. From 1866 to 1869, he was superintendent of the Calumet and Hecla copper mines, Lake Superior, and amassed a great fortune, of which he gave liberally to Harvard. He was curator of the museum in Cambridge from 1874 to 1885. Professor Agassiz is a member of the National Academy of Sciences and other scientific societies in this country and Europe. He is one of the great authorities on marine zoology.

Agassiz, LOUIS JOHN RUDOLPH (1807-1873), an eminent naturalist, son of a Swiss Protestant clergyman. He completed his education at Lausanne, and early developed a love of the natural sciences. He studied medicine at Zürich, Heidelberg, and Munich. His attention was first specially directed to ichthyology by being called on to describe the Brazilian fishes brought to Europe from Brazil by Martius and Spix. Directing his attention to fossil ichthyology, five volumes of his appeared between 1834 and 1844. His researches led him to propose a new classification of fishes which he divided into four classes, distinguished by the characters of the skin. His system has not been generally adopted, but the names of his classes have been used. In 1836 he began the study of glaciers. From 1838 he had been professor of natural history at Neuchâtel, when in 1846 pressing solicitations and attractive offers induced him to settle in America, where he was connected as a teacher first with Harvard University, Cambridge, and latterly with Cornell University as well as Harvard. After his arrival in America he engaged in various investigations and explorations, and published numerous works. In 1865-66 he made zoological excursions and investigations in Brazil, which were productive of most valuable results. Agassiz held views on many important points in science different from those which prevailed among the scientific men of the day, and in particular he opposed the theory of evolution. Pl. 8, Vol. I.

Agassiz, Mount, an extinct volcano in Arizona, 10,000 feet in height; a place of summer resort, near the Great Cañon of the Colorado.

Agave

Ag'ate, a siliceous, semi-pellucid compound mineral, consisting of bands or layers of various colors blended together; the base generally being chalcedony, and this mixed with variable proportions of jasper, amethyst, quartz, opal, heliotrope, and carnelian. The varying manner in which these materials are arranged causes the agate when polished to assume some characteristic appearances, and thus certain varieties are distinguished, as the ribbon agate, the fortification agate, the zone agate, the star agate, the moss agate, the clouded agate, etc. In Scotland they are cut and polished under the name of Scottish pebbles. Agates are found at Agate Bay, Lake Superior, and in Colorado. In Apache co., Ariz., is a wonderful petrified forest where the ground is covered with immense tree trunks turned to agate and jasper. Agatized wood is found also in Utah, New Mexico, and California.

Agathar'chus, a Greek painter, native of Samos, the first to apply the rules of perspective to theatrical scene-painting; flourished about 480 B. C.

Agathocles (361?-289, B. C.), Tyrant of Syracuse. He was the son of a Sicilian potter. After working a while at his father's trade he became a leader of banditti. He afterward became a soldier under Damas, and on the latter's death married his widow, thus acquiring immense wealth and laying the foundation of his political fortunes. He became autocrat of Syracuse in 317 B. C. He declared all debts canceled, confiscated the property of the rich and divided it among the poor. His next plan was to drive the Carthaginians out of Sicily and bring the whole island under the government of Syracuse. He was defeated by Hamilcar, the Carthaginian governor. In 310 Agathocles attacked the Carthaginian possessions and was at first successful, but in 307 a decisive battle was fought with the Carthaginians, who utterly defeated the invaders. Agathocles returned to Sicily, having made terms with the Carthaginians. He next made an attack on a people of southern Italy, made the Lipari Islands tributary, and seized the power in Crotona on the mainland. Soon afterward he died. During the despotism of Agathocles the naval power of Syracuse was raised to a place of considerable importance.

Agave (a-gá'vê), a genus of plants, popularly known



Agave.

as American aloes. They are generally large, and have a massive tuft of fleshy leaves with a spiny apex. They live for many years—ten to seventy according to treatment—before flowering. When this takes place the tall flowering stem springs from the center of the tuft of leaves, and grows very rapidly until it reaches a height of 15, 20, or even 40 feet, bearing toward the end a large number of flowers. The best known species is the common American aloe now extensively grown in the warmer parts of Europe and Asia. The sap when fermented yields a beverage resembling cider, called by the Mexicans "*pulque*." The leaves are used for feeding cattle; the fibers of the leaves are formed into thread, cord, and ropes; an extract from the leaves is used as a substitute for soap; slices of the withered flower-stem are used as razor-strops.

Age, a period of time representing the whole or a part of the duration of any individual thing or being, but used more specifically in a variety of senses. In law *age* is applied to the periods of life when men and women are enabled to do that which before, for want of years and consequently of judgment, they could not legally do. Full age in male or female is twenty-one years, which age is completed on the day preceding the anniversary of a person's birth, who till that time is an infant in law.

The term is also applied to designate the successive epochs or stages of civilization in history or mythology. Hesiod speaks of five distinct ages: 1. The *Golden or Saturnian Age*, a patriarchal and peaceful age. 2. The *Silver Age*, licentious and wicked. 3. The *Brazen Age*, violent, savage, and warlike. 4. The *Heroic Age*, which seemed an approximation to a better state of things. 5. The *Iron Age*, when justice and honor had left the earth. The term is also used in such expressions as the *Dark Ages*, the *Middle Ages*, the *Elizabethan Age*, etc.

The *Archæological Ages or Periods* are three—the Stone Age, the Bronze Age, and the Iron Age, these names being given in accordance with the materials chiefly employed for weapons, implements, etc., during the particular period. The Stone Age of Europe has been subdivided into two—the Palæolithic or earlier, and the Neolithic or later. The word *age* in this sense has no reference to the lapse of time, but simply denotes the stage at which a people has arrived in its progress toward civilization. See *Archæology*.

Agent, in law, a person employed to act for another, called the principal, the relation between them being called *agency*. With reference to the authority conferred upon him, an agent may be general or special, and may be appointed expressly or by implication. No particular form of appointment is required, with a few qualifications, as that an instrument under seal is necessary to confer authority to do an act in the name of the principal under seal. Attorneys, auctioneers, brokers, factors, and shipmasters are among the ordinary classes of agents. The agent may

bind his principal by acts within the scope of his authority. He is personally liable to third persons on contracts made as the agent of an undisclosed principal, but not on those in behalf of a disclosed principal, unless he exceed his authority. Public agents are not usually themselves liable upon contracts made in their official capacity. As to torts the general rule is that the principal is liable to third persons for the tortious acts of the agent committed when acting within the scope of his agency; but this does not relieve the agent of personal liability himself. As against the principal, an agent is entitled to compensation for his services, and reimbursement for the expenses of his agency, and for personal loss or damage in properly transacting the business thereof. As a means of enforcing these rights, the law gives him a lien upon the property of the principal in his hands.

Agesila'us (442-360 B. C.), a king of Sparta. He acquired renown by his exploits against the Persians, Thebans, and Athenians. Though a vigorous ruler, and almost adored by his soldiers, he was of small stature and lame from his birth. He died in Egypt. Xenophon, Plutarch, and Cornelius Nepos are among his biographers.

Agglu'tinate Languages, languages in which the modifying suffixes are, as it were, glued on to the root, both it and the suffixes retaining a kind of distinctive independence and individuality, as in the Turkish and other Turanian languages, and the Basque language.

Agincourt (â-zhan-kör), a village of northern France, department Pas de Calais, famous for the battle of Oct. 25, 1415, between the French and English.

Agis (â'jis), the name of four Spartan kings, the most important of whom was Agis IV, who succeeded to the throne in B. C. 244, and reigned four years. He was entrapped and executed by his rival, Leonidas.

Agnesi (â-nyā'sē), MARIA GAETANA (1718-1799), a learned Italian lady, born at Milan. In her ninth year she was able to speak Latin, in her eleventh Greek; was a University professor.

Agnew, D. HAYES, American surgeon (1818-1892). He was a specialist on diseases of the eye and of women. He was a profound anatomist, and had wonderful skill and ease in operating. Sympathetic and gentle, he was an ideal physician and consultant. He was emeritus professor of surgery, and honorary professor of clinical surgery, at University of Pennsylvania. He became widely known through his treatment of President Garfield's wound. Doctor Agnew has written *Practical Anatomy* (1856), and *The Principles and Practices of Surgery* (1878-83).

Agnostics (ag-nos'tiks), a modern term applied to those who disclaim any knowledge of God or of the origin of the universe, holding that the mind of man is limited to a knowledge of phenomena and of what is relative, and that, therefore, the infinite, the absolute,

Agnus Dei

and the unconditioned, being beyond all experience, are consequently beyond its range.

Agnus Dei (dē'i), a term applied to Christ in John 1:29, and in the Catholic liturgy a prayer beginning with the words "Agnus Dei," generally sung before the communion. The term is also commonly given to a medal, or more frequently a cake of wax, consecrated by the pope, stamped with the figure of a lamb supporting the banner of the cross.

Agouti (a-gō'ti), the name of several rodent mammals, forming a family by themselves. There are eight or nine species, all belonging to S. America and the W. Indies. The com-



Agouti.

mon agouti, or yellow-rumped cavy, is of the size of a rabbit. It burrows in the ground or in hollow trees, lives on vegetables, doing much injury to the sugar-cane, is as voracious as a pig, and makes a similar grunting noise. Its flesh is white and agreeable.

Agra (ā'gra), a city of India, in the n. w. Provinces, 841 miles from Calcutta. It has interesting structures, among which are the imperial palace, the Motī Masjid, or Pearl Mosque; the mosque called the Jama Masjid (a cenotaph of white marble); and the Taj Mahal, a mausoleum of the seventeenth century, built by the emperor Shah Jehan to his favorite queen. Agra has a trade in grain, sugar, etc., and manufactures, including inlaid mosaics. It was founded in 1566 by the emperor Akbar, and was a residence of the emperors for over a century. Pop. 160,203. The Agra division has an area of 10,151 sq. mi., and a population of 4,834,064.

Agram (og'rom), or Zagreb, a city in the Austrian Empire, capital of Croatia and Slavonia, contains the government buildings, cathedral, university, theater, etc.; carries on an active trade, and manufactures tobacco, leather, and linens. Pop. 28,360.

Agraphia. See *Aphasia*.

Agrarian Laws, laws enacted in ancient Rome for the division of the public lands. The right to the use of the public land belonged originally only to the ruling class; but latterly the claims of the plebeians on it were also admitted, though they were often unfairly treated in the sharing of it. Hence arose much discontent among the plebeians, and various remedial laws were passed with more or less success.

Agricola, CNEIUS JULIUS (A. D. 37-93), a Roman consul under the emperor Vespasian, reduced the greater part of Britain to the

Agriculture

dominion of Rome; distinguished as a statesman and general. His life, written by his son-in-law, Tacitus, gives the best extant account of Britain in the early part of the period of the Roman rule. He was the twelfth Roman general who had been in Britain, but was the only one who effectually subdued the southern portion of it and reconciled the Britons to the Roman yoke. He constructed the chain of forts between the Forth and the Clyde, and sailed round the island, discovering the Orkneys.

Agriculture, the art of cultivating the ground for the purpose of raising grain and other crops for man and domestic animals. Agriculture is the oldest of occupations and the basis of all other arts. It began with the dawn of civilization and, with occasional interruptions, has continued to make progress to the present time. The Egyptians, Babylonians, Assyrians and Chinese are the oldest civilized nations who practiced agriculture systematically. Many references to Egypt as a grain or corn country are found in the Old Testament, and in the earliest records of the other ancient nations we find references to their agriculture. The Greeks carried on agriculture to a limited extent, but with systematic methods and good results, though their country was not well suited to this line of industry. The Romans attained great perfection in the art and became the foremost of the ancient nations. Several of their writers produced works on agriculture, which show that they were familiar with and practiced the best principles and methods in vogue at the present time. Among these writers is Cato, whose works on the subject are somewhat voluminous, and Virgil, who in his *Georgics* most gracefully treats the subject in verse. The Romans were familiar with the use of fertilizers, the rotation of crops, methods of breeding domestic animals and irrigation. Wherever they went they took their knowledge and methods of agriculture, and as a result of their conquests this art received great advancement in Britain and a number of other countries of Europe and Western Asia.

A decline in agriculture seems to be coincident with that of the Roman empire. During the Middle Ages nearly all of the land in Europe was owned by the nobility, who spent their time in war and the chase, and left the tilling of the soil to serfs and vassals. As a result agriculture almost became a lost art and it was not until the sixteenth century that it again received attention. During this century the foundations of the present methods were laid in England and a number of the other European countries, and from that time to the present its progress has been regular and systematic. The leading agricultural countries of Europe are England, France and Germany.

THE UNITED STATES. The early English settlers brought with them the methods of agriculture in vogue in the mother country and tried to adapt these to their new surroundings. Their implements were crude, their seed scarce and often of inferior quality, and in New Eng-

land the soil was stubborn and the climate unfavorable. Under these conditions it is not surprising that the early colonists made but little progress, and, with the exception of tobacco and cotton, only sufficient crops were raised to supply the needs of the family or a very limited local market. This condition continued until after the Revolutionary War, and the farmers became so wedded to their old methods that changes for the better were received with but little favor.

The opening up to settlement of the vast territory in the Mississippi valley and the wonderful fertility of the prairie lands, led to new and improved methods of agriculture. The construction of railways and canals into this territory enabled the farmers of the newer states to successfully compete in the eastern markets with those of the older states, and in a short time this competition became so strong as to compel the farmers of New England and the North Atlantic States to change both their methods and their crops.

The great demand for American agricultural products by the nations of Europe led the government to take active measures for the development of agriculture, the most important of which was the establishment of the Department of Agriculture (which see).

Agricultural Colleges. These were established in 1862 for the purpose of giving systematic education in agriculture, and in 1890 each college was granted \$15,000 a year toward its support, which amount has now been increased to \$25,000. These colleges are maintained in each state, and most of them in connection with the State Universities.

Agricultural Experiment Stations. These are stations for carrying on scientific experiments in the interests of agriculture, dairying and horticulture. They are maintained by the government, which appropriates \$15,000 a year to each state and territory for this purpose, and most of the states supplement this appropriation by one of their own. The purpose of these stations is to carry on extended scientific experiments with fertilizers and soils, and to improve varieties of grain, fruit and live stock. There are now sixty such stations in the country, fifty-four of them being connected with agricultural colleges.

Agricultural Education. In addition to establishing the agricultural colleges and experiment stations, the government, in connection with the different states, carries on a system of educational extension among farmers, through its publications, and in New York and one or two other states, through courses of reading and study which are supervised by the Agricultural College of the state. In addition to this a number of states have established agricultural schools of a secondary grade, which admit students with less preparation than is required for admission to the colleges, and whose work is to fit these students for practical farmers. Also many states are now introducing the elements of agriculture into their courses of study in the public schools.

Agricultural Machinery. The invention and

manufacture of agricultural machinery in the United States has been one of the greatest agencies in promoting agriculture and bringing it to its present degree of perfection. The first machine of importance was the cotton gin, invented by Eli Whitney in 1793. This was followed by the reaper and the thrashing machine. To these machines must be added the numerous patterns of plows, cultivators, seeders, harrows and machines for dairy purposes and other branches of farm industry. The department of agriculture estimates that through these inventions the work of farm labor has been made more than twenty times as productive as it was in 1830. The use of agricultural machinery has greatly reduced the expense of our leading productions and made possible the cultivation of the great farms in the Mississippi valley and the Northwest.

The beginning of the century reveals many important improvements in agriculture. These follow the lines of more scientific methods in the adaptation of the farms of each locality, and often of each farm, to the particular product that the soil and the market make most advantageous, also advancement in the improved breeding of live stock. The beef cattle and milch cows of the present time are of much greater service to the farmer and much more valuable than were those of fifty or even twenty-five years ago. Improved varieties of grain and fruit have also been developed and put into use to such an extent that the United States now leads all countries in its agricultural production.

The census of 1900 showed that there were in the United States 5,739,657 farms, that the value of farm property was \$20,514,001,838, the value of live stock was \$3,780,050,041 and of farm products \$4,739,118,752.

The average yield of the leading crops in the country is: corn, 2,220,000,000 bushels; wheat, 850,000,000 bushels; oats, 750,000,000 bushels; cotton, 10,500,000 bales; tobacco, 800,000,000 pounds.

The dairy statistics show that the United States contains 18,000,000 milch cows, manufactures 1,430,000,000 pounds of butter, 300,000,000 pounds of cheese, and consumes otherwise 2,090,000,000 gallons of milk. The average yearly value of the entire dairy products of the country is about \$451,600,000.

Agriculture, United States Department of.

The department of agriculture was organized by an act of Congress in 1862, in response to a plea for such a department by Honorable David P. Holloway, in the first report of the Commissioner of Agriculture. In 1889 it was made one of the executive departments of the government and its head was made Secretary of Agriculture and given a seat in the President's cabinet. Honorable Norman J. Coleman of Missouri, who was at the time Commissioner of Agriculture, was the first secretary. His successors, in order of their appointment, have been Jeremiah Rusk of Wisconsin, J. Sterling Morton of Nebraska, and James Wilson of Iowa.

Previous to its present advancement the department of agriculture had been greatly enlarged and its work proportionately extended. The division of Botany was organized in 1868 and the divisions of Pomology, Ornithology and Mammalogy, with a section of Vegetable Pathology, were added in 1886, and a bureau of animal industry was established in 1884. During the administration of Secretary Rusk the division of publications was established, and the weather bureau was transferred from the signal service division of the army to this department. Under Secretary Morton divisions of Agrostology and Soils and the sections of foreign markets and the road inquiry were added.

The expense of the work and increased demands upon the department rendered its entire reorganization necessary under Secretary Wilson. This reorganization placed the Department of Agriculture on the same basis as the other government departments and brought it into much closer relation with the state agricultural colleges and experiment stations of the country. The scope of its work has also been broadened and its methods of administration simplified. In 1901 Congress added four new bureaus, the Bureau of Plant Productions, the Bureau of Soils, the Bureau of Forestry and the Bureau of Chemistry. The Bureau of Plant Productions is not a new department, but is a consolidation of what was formerly the divisions of Botany, Vegetable Physiology, and Pathology, Agrostology, Seeds, Pomology and Gardens and Grounds.

In connection with the agricultural experiment stations and agricultural colleges, the department carries on the following lines of work:

(1) Improvement in plant production. This is secured by breeding, whereby better varieties are obtained. The Illinois experiment station has improved the quality of corn to a marked degree, as has the Minnesota station the quality of wheat. Plant production is further improved by the discovery of new varieties, such as the macaroni wheat, which are better adapted to the localities than those already used, also by the introduction of new plants, like the alfalfa, into localities for which they are specially suited.

(2) The study of soils. This is for the purpose of determining the adaptation of soils to crops, and a systematic study of soils is now in progress on an extensive scale. While it will require some years to complete the work, as far as it has been carried it has given satisfactory results.

(3) The study of rotation of crops. This is of great importance in those localities where farmers are prone to raise the same crop year after year, thereby exhausting the soil.

(4) The improvement and perfection of breeds of live stock.

(5) The issue of frequent bulletins which give the results of investigations in various bureaus. The department is now issuing over 500 different documents, whose annual publication exceeds 7,000,000 copies.

The annual appropriations for the department are about \$3,900,000, of which \$720,000 is for state agricultural experiment stations.

One of the most important of recent changes in the department was the organization of the Division of Forestry into the Bureau of Forestry, whereby its powers were extended and its appropriations increased. The Bureau now manages the forest reserves, preventing thefts of lumber and, as far as possible, forest fires. The Bureau also assists farmers, lumbermen and others in managing forest lands, and except on large estates this assistance is given without charge to the owner, but the proprietors of large estates are required to pay the traveling expenses and board of their assistants.

Agrirentum (jen'tum), now called Girgenti, an ancient Greek city of Sicily, founded about 582 B. C., and long one of the most important places on the island. During the sixth century B. C. it rose to great power and had a population of 200,000. Extensive ruins of temples and public buildings still attest its ancient magnificence. It was destroyed by the Carthaginians in 405 B. C.; conquered by the Romans, later by the Saracens, and then by the Normans. It belonged successively to Spain, Germany, Austria, and Italy. Pop. 22,000.

Agrimony, a genus of plants of the order Rosaceæ. It grows on waysides and waste fields, stands two feet tall, bears downy, pinnate leaves and racemes of small yellow flowers. The plant has an aromatic odor and is bitter to the taste.

Agrip'pa, CORNELIUS HENRY (1486-1535), born at Cologne, was a man of talents, learning, and eccentricity. In his youth he was secretary to the Emperor Maximilian I; he subsequently served seven years in Italy, and was knighted. On quitting the army he devoted himself to science, and became famous as a magician and alchemist, and was involved in disputes with the churchmen.

Agrippa, MARCUS VIPSANIUS (B. C. 63-12), a Roman statesman and general, the son-in-law of Augustus. He commanded the fleet of Augustus in the battle of Actium. To him Rome is indebted for three of her principal aqueducts, the Pantheon, and other works of public use and ornament.

Aguinaldo, Emilio, the leader of the Filipino revolution against the authority of the United States was born about 1870. It is not known who his parents were, but he was brought up in the home of a learned Jesuit priest in the province of Cavite, where he is said to have received kind treatment and considerable elementary education. When about fifteen years of age he became a student in the medical department of the Pontifical university at Manila. Little is known of his college career. He attracted the attention of the Spanish authorities by joining the Masonic order, an act which in the Philippines was considered an unpardonable sin. About 1888 he became involved with the authorities and went to Hongkong, where he came in contact with the British, and received considerable information about modern methods of warfare. He is

Ahab

said to have served some time also in the Chinese army and as a member of the crew of a Chinese warship, under European instructors. Returning to the Philippines, he became mayor of Cavité Viejo and was acting in that capacity at the outbreak of the insurrection in 1896. Owing to the prominent part he took in this uprising, Aguinaldo was offered a large sum of money to leave the country. He accepted the terms and went into exile at Hong-kong. At the outbreak of the Spanish-American war he returned to Manila for the avowed purpose of aiding the United States, but in the next year assumed the offensive against the United States. He directed the rebel forces with considerable ability, maintaining his supremacy by an unusual shrewdness, combined with great firmness of character. After a number of severe engagements, his troops became so hard pressed that they were compelled to flee to the mountains. In March, 1901, while in temporary headquarters at Palanan, Aguinaldo was captured. He was brought to Manila, where, on April 2d, he took the oath of allegiance to the United States and issued a proclamation to the Filipinos in which he advised them to lay down their arms and acknowledge the sovereignty of the United States. Although at first in close confinement at Manila, his consistent friendliness toward the Americans soon gained him considerable liberty.

Aguirre, LOPE DE (1507-1561), a Spanish explorer and adventurer. He came to America at an early age and in Peru took an active part in the insurrections which followed the subjugation of the Incas. He afterward joined Pedro de Ursua's expedition to South America in search of El Dorado. Having brought about the death of Ursua, he put Fernando de Guzman in his place and forced his companions to renounce their allegiance to Spain and acknowledge Guzman as their king. Afterward he quarreled with Guzman and murdered him and all his closest friends. He then made his way to the Orinoco, where he built a fleet of ships and sailed to Margarita, planning to fight his way across Panama into Peru. Being forced to abandon this plan, he landed instead on the coast of Venezuela and marched some distance inland, but was met and slain in battle at Barquisimeto. In Spain he was known as the "traitor" and in Peru as the "tyrant."

A'hab, the seventh king of Israel, succeeded his father Omri 928 B. C., and reigned twenty years. At the instigation of his wife Jezebel he erected a temple to Baal, and became a cruel persecutor of the true prophets. He was killed by an arrow at the siege of Ramoth-Gilead.

Ahasue'rus, in scripture history, a king of Persia, probably the same as Xerxes, the husband of Esther, to whom the Scriptures ascribe a singular deliverance of the Jews from extirpation. AHASUERUS is also a Scripture name for Cambyses, the son of Cyrus (Ezra 4:6), and for Astyages, king of the Medes (Dan. 9:1).

A' haz, the twelfth king of Judah, succeeded his father Jotham, 742 B. C. Forsaking the true religion he gave himself up to idolatry, and

Air

plundered the temple to obtain presents for Tiglath-pileser, king of Assyria.

Ahazi'ah.—1. Son of Ahab and Jezebel, and eighth king of Israel, died from a fall through a lattice in his palace at Samaria after reigning two years (B. C. 896, 895).—2. Fifth king of Judah, and nephew of the above. He reigned but one year and was slain (B. C. 884) by Jehu.

Aimard (ä-mär), GUSTAVE (1818-1883), French novelist. He lived for ten years among the Indians of North America, and wrote a number of stories dealing with Indian life, which have been popular in English translations.

Ain (an), a southeastern frontier department of France, mountainous in the east (ridges of the Jura), flat or undulating in the west, divided into two nearly equal parts by the river Ain, a tributary of the Rhone. Area, 2,239 sq. mi. Capital, Bourg. Pop. 364,408.

Ainmiller (in'mil-er), Max Emanuel (1807-1870), a German artist who may be regarded as the restorer of the art of glass-painting. As inspector of the state institute of glass-painting at Munich he raised this art to a high degree of perfection by the new or improved processes introduced by him. Under his supervision this establishment produced a vast number of painted windows for ecclesiastical and other buildings, among the principal being a series of forty windows, containing 100 historical and Scriptural pictures in Glasgow Cathedral. His son Heinrich, born 1837, followed in his father's footsteps.

Ainos (i' nōz), the native name of an uncivilized race of people inhabiting the Japanese island of Yesso, as also Saghalien and the Kurile Islands, and believed by some to be the aboriginal inhabitants of Japan. They do not average over 5 feet in height, but are strong and active. They have matted beards 5 or 6 inches in length, and black hair which they allow to grow till it falls over their shoulders. Their whole body is covered with thick hair. They are the hairiest and also the filthiest people on the globe. Their complexion is dark brown, approaching to black. They worship the sun and moon, and pay reverence to the bear. They support themselves by hunting and fishing.

Ainsworth, WILLIAM HARRISON (1805-1882), an English novelist. He wrote *Rookwood*, *Jack Sheppard*, and about forty other novels, including *Guy Fawkes*, *Tower of London*, *Windsor Castle*, *Lancashire Witches*, *Flitch of Bacon*, etc.

Ain-Tab (ä-in-täb'), a town of northern Syria, 60 miles north of Aleppo; with manufactures of cottons, woollens, leather, etc., and an extensive trade. There is here an American Protestant mission. Pop. 20,000.

Air, the gaseous substance of which our atmosphere consists, being a mechanical mixture of 79.19 per cent. by measure of nitrogen and 20.81 per cent. of oxygen. The latter is absolutely essential to animal life, while the purpose chiefly served by the nitrogen appears to be to dilute the oxygen. Oxygen is more soluble in water than nitrogen, and hence the air dissolved in water contains about 10 per cent. more oxygen than atmospheric air. The

oxygen therefore available for those animals which breathe by gills is somewhat less diluted with nitrogen, but it is very much diluted with water. For the various properties and phenomena connected with air, see such articles as *Atmosphere*, *Aeronautics*, *Air-pump*, *Barometer*, *Combustion*, *Respiration*.

Air-cells, cavities in the cellular tissue of the stems and leaves of plants which contain air only, the juices of the plants being contained in separate vessels. They are largest and most numerous in aquatic plants, as in the lily, the gigantic leaves of which are buoyed up on the surface of the water by their means.—The minute cells in the lungs of animals are also called air-cells. There are also air-cells in the bodies of birds. They are connected with the respiratory system, and are situated in the cavity of the thorax and abdomen, and sometimes extend into the bones. They are most fully developed in birds of powerful and rapid flight, such as the albatross.

Air-engine, an engine in which air heated, and so expanded, or compressed air, is used as the motive power. A great many engines of the former kind have been invented, some of which have been found to work pretty well where no great power is required. They may be said to be essentially similar in construction to the steam-engine, though of course the expansibility of air by heat is small compared with the expansion that takes place when water is converted into steam. Engines working by compressed air have been found very useful in mining, tunneling, etc., and the compressed air may be conveyed to its destination by means of pipes. In such cases the waste air serves for ventilation and for reducing the oppressive heat.

Air-gun, an instrument for the projection of bullets by means of condensed air, generally either in the form of an ordinary gun, or of a stout walking-stick and about the same length. A quantity of air being compressed into the air-chamber by means of a condensing syringe, the bullet is put in its place in front of this chamber, and is propelled by the expansive force of a certain quantity of the compressed air, which is liberated on pressing the trigger.

Air-plants (or Epiphytes), are plants that grow upon other plants or trees, apparently without receiving any nutriment otherwise than from the air. The name is restricted to flowering plants (mosses or lichens being excluded) and is suitably applied to many species of orchids. The conditions necessary to the growth of such plants are excessive heat and moisture, and hence their chief localities are the damp and shady tropical forests of Africa, Asia, and America. They are particularly abundant in Java and tropical America.

Air-pump, an apparatus by means of which air or other gas may be removed from an enclosed space; or for compressing air within an enclosed space. An ordinary suction-pump for water is on the same principle as the air-pump; indeed, before water reaches the top

of the pipe the air has been pumped out by the same machinery which pumps the water. An ordinary suction-pump consists essentially of a cylinder, or barrel, having a valve opening from the pipe through which water is to rise and a valve opening into the outlet pipe, and a piston fitted to work in the cylinder (the outlet valve may be in the piston). See *Pump*. The arrangement of parts in an air-pump is quite similar. The barrel of an air-pump fills with the air which expands from the receiver (that is, the vessel from which the air is being pumped), and consequently the quantity of air expelled at each stroke is less as the exhaustion proceeds, the air getting more and more rarefied. Many interesting experiments may be made with the air-pump. If an animal is placed beneath the receiver, and the air exhausted, it dies almost immediately; a lighted candle under the exhausted receiver immediately goes out. Air is thus shown to be necessary to animal life and to combustion. A bell, suspended from a silken thread beneath the exhausted receiver, on being struck cannot be heard. If the bell be in one receiver from which the air is not exhausted, but which is within an exhausted receiver, it still cannot be heard. Air is therefore necessary to the production and to the transmission of sound. A shriveled apple placed beneath an exhausted receiver becomes as plump as if quite fresh, being thus shown to be full of elastic air. The air-pump was invented by Otto von Guericke, about the year 1654.

Air Ship. See *Flying Machines*.

Airy, SIR GEORGE BIDDELL, a distinguished English astronomer, b. 1801. At Cambridge he was professor of mathematics, and subsequently professor of astronomy and experimental philosophy, in the latter capacity having charge of the observatory. In 1835 he was appointed superintendent of the observatory at Greenwich. He has made numerous valuable investigations on subjects connected with astronomy, physics, and mathematics.

Aisne (ân), a department of France; area, 2,838 sq. mi. It contains the important towns of St. Quentin, Laon (the capital), Soissons, and Château Thierry. Pop. 555,925.

Aix (âks), a town of southern France, department Bouches-du-Rhône. Aix was founded in 123 B. C. by the Roman consul Caius Sextius Calvinus, and from its mineral springs was called *Aqua Sextia* (Sextian Waters). Between this town and Arles, Marius gained his great victory over the Teutons, 102 B. C. In the Middle Ages the counts of Provence held their court here, to which the troubadours used to resort. Pop. 19,686.

Aix-la-Chapelle (âks-lâ-shâ-pel), a city of Rhenish Prussia, 38 miles west by south of Cologne. The most important building is the cathedral, the oldest portion of which, often called the nave, was erected in the time of Charles the Great (Charlemagne) as the palace chapel, about 796. A gold coffin containing the remains of Charlemagne is to be seen in the cathedral at the present time. There are a number of warm sulphur springs

Ajaccio

here, and several chalybeate springs, with ample accommodation for strangers. It was the favorite residence of Charles the Great, who died here in 814. Thirty-seven German emperors and eleven empresses have been crowned in it, and the imperial insignia were preserved here till 1795, when they were carried to Vienna. Pop. 95,725.—*Congress of Aix-la-Chapelle*, a congress held in 1818, by which the army of the allies in France was withdrawn after France had paid the contribution imposed at the peace of 1815, and independence restored to France.—*A treaty of peace* concluded at this city, May 2, 1668, as a result of the Triple Alliance, put an end to the war carried on against Spain by Louis XIV in 1667, after the death of his father-in-law, Philip IV.—*The second peace of Aix-la-Chapelle*, Oct. 18, 1748, terminated the Austrian war of succession.

Ajaccio (à-yách'ò), the capital of Corsica, the birthplace of Napoleon, and the seat of a bishop, with coral and sardine fisheries, and a considerable trade. Pop. 15,351.

A'jax, the name of two Grecian chiefs who fought against Troy, the one being son of Æleus, the other, son of Telamon. The latter was from Salamis, and sailed with twelve ships to Troy, where he is represented by Homer as the boldest of the Greeks, after Achilles. On the death of Achilles, when his arms, which Ajax claimed, were awarded to Ulysses, he became insane and killed himself. This is the subject of Sophocles's tragedy *Ajax*.

Ajmeer' (Ajmir or Ajmer), a British commissionership in India, Rajputána, divided into the two districts of Ajmeer and Mairwara. Area 2,711 sq. mi.; pop. 460,722.—Ajmeer, the capital, a favorite residence of the Mogul emperors, is 279 miles s. w. of Delhi. It is surrounded by a wall, and possesses a government college, as also Mayo College for Rajpoot nobles, a Scottish mission, a mosque that forms one of the finest specimens of early Mohammedan architecture extant, and an old palace of Akbar, now the treasury; trade in cotton, sugar, salt, etc. Pop. 34,763.

Ak'bar (1542-1605), a Mogul emperor, the greatest Asiatic prince of modern times. He was born at Amerkote, in Sind, succeeded his father, Humayun, at the age of thirteen, and governed first under the guardianship of his minister, Beyram, but took the chief power into his own hands in 1560. His mausoleum at Secundra, near Agra, is a fine example of Mohammedan architecture.

A Kempis, THOMAS, See *Thomas à Kempis*.

Akermann', a seaport of southern Russia, in Bessarabia. The vicinity produces quantities of salt and also fine grapes, from which excellent wine is made. A treaty was signed here, Oct. 6, 1826, between Russia and the Porte, by which Moldavia, Wallachia, and Servia were released from all but nominal dependence on Turkey. Pop. 29,609.

Akmollinsk', a Russian province in Central Asia, largely consisting of steppes and wastes. Area 210,000 sq. mi.; pop. 463,347.—Akmol-

Alabama

insk, the capital, is a place of some importance for its caravan trade. Pop. 3,130.

Akron, Summit co., O., 35 miles s. e. of Cleveland. Railroads, Erie; B. & O.; C. A. & C.; A. & C. Junction; P. & W.; C. T. & V.; and Northern Ohio. Industries, rubber works, five cereal mills, iron foundry, sewer pipe, linoleum, boiler, farm implements, and other factories, printing works, and potteries. Surrounding country agricultural, bituminous coal in vicinity. The town was first settled in 1810 and became a city in 1836. Population, 1900, 42,728.

Alabama, one of the southern states of the U. S. Its length is 330 miles, average breadth 154, and area 50,722 sq. mi. The Alleghany range stretches into the northern portion of the state, but the elevation is nowhere great. The Alabama is the chief river of the state. It is formed by the junction of the Coosa and the Tallapoosa, which unite about 10 miles above the city of Montgomery. Forty-five miles above Mobile the Alabama is joined by the Tombigbee, and from that point is known as the Mobile River. It is navigable from Mobile to Wetumpka, on the Coosa, some 460 miles. The Tombigbee is navigable to Columbus, and the Black Warrior, one of its chief tributaries, to Tuscaloosa. The Tennessee flows through the northern portion of the state, and the Chattahoochee forms part of its eastern boundary.

Soil.—The southern portion of the state has an alluvial formation, and a light but productive soil well adapted to raising fruits. Cotton and corn are produced, and there are extensive forests of pine in this region. North of this tract is a division known as the cotton belt, mostly prairie land, largely devoted to the culture of cotton. The great mineral region is in the eastern and northeastern part of the state. Gold has been found here in paying quantities for many years. There is also bituminous coal mined in this region as well as other valuable minerals. West of this is a manufacturing district well supplied with water power. In the northern part of the state are rich grazing lands which yield large crops of cereals and fruits.

Vegetation.—In Alabama vegetable products of the temperate and semi-tropical regions thrive. The principal forest trees are oak, hickory, chestnut, cedar, elm, and pine. There are also some dense cane-brakes, which have now for the most part been cleared away, leaving a most fertile soil.

In the southern parts of the state are forests of cyprus, yellow pine, and magnolia. Also the fig and pomegranate, olive, apricot, and orange trees. Grasses, the cereals, and corn, and in the valleys, cotton, are raised in the northern part of the state. In the southwestern part of the state is grown sugar, rice, and some indigo; tobacco is grown to some extent.

Climate.—The climate of Alabama varies with the latitude and elevation. The northern counties have a delightful temperate climate, the thermometer in winter seldom falling below 32° Fahrenheit, while the eleva-

Alabama

tion prevents intense heat in the summer. Some of the river valleys are very unhealthy, and on the other hand there are several resorts for invalids in the state. In the southern part of the state there is a great tendency to malaria and fevers. But for the gulf breezes the heat would be almost unbearable. The water supply is from artesian wells in the southern part of the state, while the northern part is supplied with springs and good wells.

Manufactures.—Within the last twenty-five years Alabama has made rapid strides in the establishment of manufacturing industries. There are a number of large saw-mills, grist-mills and leather-dressing establishments, boot and shoe factories, turpentine distilleries, carriage and wagon factories, in operation, employing thousands of men. The manufacture of pig-iron, machinery, and cotton goods, has been carried on with remarkable success, and several large factories have been established. The total value of the manufactures for 1900 was \$78,529,942.

Education.—There are seven normal schools in the state located at Florence, Jacksonville, Troy, Livingston, Montgomery, Tuskegee and Huntsville. The State University is located at Tuscaloosa. Other state institutions are the Polytechnic Institute at Auburn; Industrial School for White Girls, Montevallo; and an institute for the deaf, dumb and blind at Talladega. There are ten agricultural schools and experiment stations, two medical colleges, one dental college, a preparatory school for mines and mining, and an industrial school for boys, all having official connection with the state.

History.—The first settlement in Alabama was made on the Mobile River in 1702 by the French. The city of Mobile was founded in 1712. Alabama was made a state of the Union in 1819 and was one of the seceding states in 1861. Principal towns: Montgomery, the capital; Mobile, Birmingham. Pop. 1900, 1,828,697, of which 827,545 are colored.

Governors.—William W. Bibb, 1819-20; Thomas Bibb, 1820-21; Israel Pickens, 1821-25; John Murphy, 1825-29; Gabriel Moore, 1829-31; John Gayle, 1831-35; Clement C. Clay, 1835-37; Arthur P. Bagby, 1837-41; Benjamin Fitzpatrick, 1841-45; Joshua L. Martin, 1845-47; Reuben Chapman, 1847-49; Henry W. Collier, 1849-53; John A. Winston, 1853-57; Andrew B. Moore, 1857-61; John G. Shorter, 1861-63; Thomas H. Watts, 1863-65; Lewis E. Parsons, 1865; Robert M. Patton, 1865-68; William H. Smith, 1868-70; Robert B. Lindsay, 1872; D. P. Lewis, 1872-74; G. S. Houston, 1874-79; R. W. Cobb, 1879-81; E. A. O'Neal, 1882-84-86; T. Seay, 1886-88-90; T. G. Jones, 1890-94; W. C. Oates, 1894-96; J. F. Johnston, 1896-1900; W. J. Samford, 1900.

Alabama, a river of Alabama, formed by the junction of the Coosa and the Tallapoosa. After a course of 300 miles, it joins the Tombigbee and assumes the name of the Mobile.

Alabama, a vessel built at Birkenhead, England, in 1862, by Messrs. Laird & Sons, for the Confederate Government. She was a

Alabaster

piratical craft, and it is certain that she was forced to deal with her captures precisely as a pirate does, against whom every port is closed; i. e., she first plundered and then burnt them. Her devastations gave rise to the *Alabama* question, and ultimately cost Great Britain over \$16,000,000. The cruiser was a wooden ship of 1,040 tons' register, barque-rigged, with two engines of 350 horse-power each, pierced for 12 guns, besides being able to carry two heavy pivot-guns amidships, and cost in all nearly \$260,000. At Terceira, one of the Azores, she received guns, stores, and coals from another vessel. Captain Semmes then stepped on board, and Aug. 24, 1862, produced his commission, named the vessel the *A.*, hoisted the Confederate flag, and prepared for work. Before September 16 she had destroyed more than her own cost, and for nearly two years after she was the terror of Union merchantmen in every sea. In all, she captured sixty-five vessels, and destroyed property estimated at \$4,000,000. Swift-sailing cruisers scoured the seas in search of the *pirate*, who, was at length forced, partly from want of stores, to take refuge in the port of Cherbourg, on the coast of Normandy, June 11, 1864. A few days later, the U. S. steamer *Kearsarge*, commanded by Captain Winslow, also arrived at Cherbourg. June 19 a fight took place outside the port and in less than an hour the *A.* was sunk. Semmes and others were picked up by an English yacht, the *Deerhound*.

Not many months after the *A.* had commenced her destructive career, Mr. Seward, in his capacity of secretary of state, informed the British Government that the U. S. held themselves entitled to damages for the injuries done to American commerce by a vessel fitted out for war in a British port, and would claim them in due time. The idea took strong hold of the American mind, and at length Great Britain was induced to submit to arbitration the question of her culpability in regard to the escape of the *A.* A congress met at Geneva Dec. 17, 1871, consisting of representatives of Great Britain and the U. S., and of three members appointed by the king of Italy, the president of the Swiss Confederation, and the emperor of Brazil. The decision was given Sept. 15, 1872. It was adverse to Great Britain, which was ordered to pay to the U. S. the sum of \$16,145,833. After all awards were made to private claimants about \$8,000,000 still remained unclaimed.

Alabaster, a name applied to a granular variety of gypsum or hydrated sulphate of lime. It was much used by the ancients for the manufact-



Alabaster.

Alagoas

ure of ointment and perfume boxes, vases, and the like. It has a fine granular texture, is usually of a pure white color, and is so soft that it can be scratched with the nail. It is found in many parts of Europe; in great abundance and of peculiarly excellent quality in Tuscany. From the finer and more compact kinds, vases, clock-stands, statuettes, and other ornamental articles are made, and from inferior kinds the cement known as plaster of Paris. A variety of carbonate of lime, closely resembling alabaster in appearance, is used for similar purposes under the name of *Oriental alabaster*. It is usually stalagmitic or stalactitic in origin, and is often of a yellowish color. It may be distinguished from true alabaster by being too hard to be scratched with the nail.

Alagoas, a maritime province of Brazil. Area 11,640 sq. mi.; pop. about 400,000. — Alagoas, the former capital of the province is about 20 mi. distant from Maceio, to which the seat of government was transferred in 1839. Pop. about 4,000.

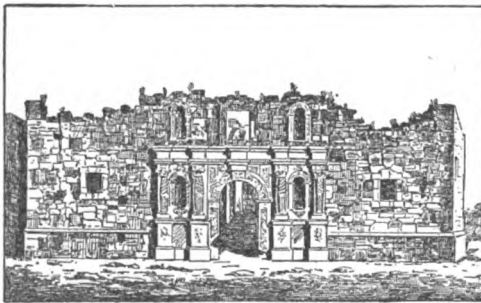
Alajuela (á-lá-ky-á'lá), a town of Central America, capital of the state of Costa Rica. Pop. 12,000.

Alameda, Alameda co., Cal., a favorite suburban residence for San Francisco business men. It is situated on the Bay of San Francisco about 8 mi. from the city, with which it is connected by a steam ferry. It is celebrated for its orchards and gardens. Pop. 1900, 16,464.

Alamo, Bexar co., Tex., celebrated for the resistance which 145 men under Col. Travis made against Gen. Santa Anna and 5,000 Mexican soldiers, from February 23 to March 6, 1836, in the war of Texan independence. The Alamo was built originally for a mission, but

Alamo

building, 191 by 18 feet. It was used as an armory and barracks. The prison was one-story, 115 by 17 feet, and from its southeast corner a diagonal ditch, over which was a strong stockade with an entrance in the center, extended to the church. The whole area enclosed was about three acres, this was supplied with water from two aqueducts. Upon the walls of the Alamo were mounted fourteen guns, three of which were planted upon the walls of the church. The stockade was protected by two pieces, and two more overlooked the gateway and prison; others were placed at various points on the walls. Col. Travis was forced to take refuge in this place, on the above mentioned date, on account of the approach of the Mexican forces under Santa Anna. He had barely time to get a few bushels of corn and about twenty-five head of bees within the enclosure. He had a very small supply of ammunition. Santa Anna appeared before the walls of the Mission and demanded an unconditional surrender, which was answered with a cannon shot. Within the improvised fortress were such men as James Bowie, David Crockett, and J. B. Bonham. They determined not to surrender under any circumstances, nor would they retreat. Santa Anna continued to draw his forces around the walls, and a constant bombardment was kept up, and although nearly 200 shells fell inside the works, not a Texan was killed during the first eight days. The walls withstood the cannonade with little or no harm. The Texans in the meantime utilized their small supply of ammunition by picking off whatever of the Mexican forces fell within the range of their rifles. Santa Anna considered several times the advisability of storming the fortress, but it was not undertaken until the arrival of 1,200 more men and some heavy guns. On March 5, Santa Anna gave the order for the attack, and in four columns they proceeded to the fortress, provided with ladders, crow-bars, and axes. The attacking forces numbered 2,500 men, aided by the cavalry, which was stationed at several points to cut off escape. Early in the morning of the 6th, the attacking forces were ready for the onset. The besieged were also prepared, and at the first assault, made a terrible slaughter with the artillery and rifles, while they remained practically unharmed. At first the Mexicans were unable to scale the outer walls, and were repulsed several times, always with terrible loss. Again the stormers returned to the attack, and it was only on account of superior numbers that they at length gained an entrance to the wall. Col. Travis was killed, and the small amount of ammunition made it impossible to keep up the artillery firing. The outer walls were abandoned and the defenders retired to the long barracks and the church. They kept up the firing as well as they could through the windows and loopholes, but the Mexicans, having now gotten control of the Alamo artillery, made short work of destroying the retreats of the defenders. Then followed a sharp hand-to-hand conflict, as the



The Alamo.

was strong enough for a place of defense, except against artillery. It had a surrounding wall of masonry over two and a half feet thick, and eight feet high. The main square was 154 yards long by 54 wide. On the southeast of it was the church, with walls of stone 4 feet thick and about 23 feet high. It was never completed and had no roof. From the northeast corner of the chapel, a wall extended northward 186 feet, thence westward, at right angles to the convent, enclosing the convent yard. The convent was a two-story adobe

Alamo

defenders retired from one room to another. At length crowded into the church, the few remaining men, among whom were David Crockett, made a determined stand and turned the gun which was mounted on the church, against the Mexicans. Their superior numbers, however, soon overcame the remainder of the defenders, and the last of the Texan heroes was slain. In less than an hour after the bugle call to the assault, the Alamo was in the possession of the Mexicans. Six of those who were besieged in the Alamo were spared, three of whom were women, two children, and Col. Travis's negro servant-boy. The Texans were denied the right of burial. Their bodies were piled in layers between wood and dry brush, and set on fire. The loss to the Mexican forces is estimated at 1,600 men. In consequence of the heroic resistance made at this place, the Alamo is known as the "Thermopylae of America." Throughout the struggle for Texan independence, the battle cry was, "Remember the Alamo."

Al'amo, a town of Mexico, state of Sonora, well built, the capital of a mining district. Pop. 12,000.

Aland (o'land) Islands, a numerous group of islands and islets, belonging to Russia, situated in the Baltic Sea, near the mouth of the Gulf of Finland. Area 468 sq. mi. The fortress of Bomarsund was destroyed by an Anglo-French force in August, 1854. The islands were ceded by Sweden to Russia in 1809. Pop. 18,000.

Alarcon' Y Mendo'za, DON JUAN RUIZ DE, one of the most distinguished dramatic poets of Spain, born in Mexico about the beginning of the seventeenth century. He came to Europe about 1622, and in 1628 he published a volume containing eight comedies, and in 1634 another containing twelve. One of them called *La Verdad Sospechosa* (*The Truth Suspected*), furnished Corneille with the groundwork and greater part of the substance of his *Menteur*. His *Tejador de Segovia* (*Weaver of Segovia*) and *Las Paredes Oyen* (*Walls have Ears*) are still performed on the Spanish stage. He died in 1639.

Al'aric I (376-410), a famous Visigothic warrior. In 394 Theodosius gave him the command of his Gothic auxiliaries. In 396 he invaded and pillaged Greece, from which, when pressed by Stilicho (397), he made a masterly retreat to Illyria. In 400 he invaded Italy, but sustained a defeat from Stilicho at Pollentia (403). A. made a second invasion of Italy, memorable for three sieges of Rome. The first (408) was bought off, but the second (409) resulted in the surrender of the city, and the substitution of Attalus for Honorius. The incapacity of Attalus induced A. to restore Honorius. Rome was besieged for the third time, 410, and sacked for six days. A. intended to invade Sicily and Africa, but dying at Cosenza, he was buried in the bed of the Busento. A. was naturally generous, and it was owing to him that the splendid edifices of Greece and Rome suffered so little damage during his invasions. The most lasting effect

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of his inroads on the Western Empire was the establishment of the Visigothic Empire in Spain by the warriors whom he left behind him.

Al'aric II, eighth king of the Visigoths, succeeded his father in A. D. 484. He preferred peace to war, and, though an Arian, granted privileges to the Catholics. In a battle at Vouillé, near Poitiers, the army of A. was defeated, and himself slain (507).

Alaska, a territory of the United States, occupying the extreme northwestern portion of North America and a narrow strip along the Pacific coast northward from British Columbia. It extends from latitude 54° 40' to 71° 30' north and from longitude 130° to 168° west from Greenwich, with its farthest point 187° west. The territory also includes the adjacent islands in the Pacific Ocean and Bering Sea, exclusive of the narrow strip between the Pacific and British territory and the peninsula of Alaska. The greatest extent of the territory north and south and east and west is nearly equal, being about 800 miles, and the total area in round numbers is about 591,000 square miles. The coast line has an extent of 8,000 miles, which is greater than the entire Atlantic Coast of the United States.

SURFACE. Topographically Alaska is divided into four districts, as follows:

(1) *The Coast District.* This extends along the coast from British Columbia to the beginning of Alaska Peninsula and inland to the coast range of mountains, and has a width varying from 30 to 75 miles. It also includes the numerous adjacent islands. The coast is very irregular and contains numerous indentations known as inlets, gulfs and canals. Several of these form excellent harbors, and a few, like Lynn Canal and Cook's Inlet, are important as affording access to the interior.

The coast district is famous for its glaciers, which fill the heads of many of the narrow inlets. Those around the head of Lynn Canal and Glacier Bay are the best known, and two of them, the Muir and the Pacific, have become celebrated on account of the large masses of ice which they discharge into the sea. The first presents an ice cliff over 200 feet in height and more than three miles long, and the second is nearly as large.

The principal rivers of this region are the Copper with its tributary, the Chichitna, and the Matanuska, Knit and Suchitna, all flowing into Cook's Inlet. The Suchitna is navigable for about 110 miles and its tributary, the Yetna, is also navigable for about 100 miles and forms a part of the route to the Kuskokwim valley.

The coast district is bounded on the north by a lofty range called the Alaskan Mountains, which form the watershed between it and the Kuskokwim and Tanana rivers. This is the highest mountain range in North America and culminates in Mt. McKinley, which has an altitude of 20,464 feet. There are also numerous lofty peaks that have not been named.

(2) *The Alaskan and Aleutian District.* This projection is formed by a continuation of the mountains in a southwestward direction from

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Niamna Lake. The chain of islands, about 150 in number, is a series of mountain peaks projecting above the sea, and reaching almost to the Asiatic coast. Some peaks have an altitude of 8,000 feet. All are extinct volcanoes and treeless, but are clothed with a coarse grass.

(3) *The Kuskokwim District.* This includes the basin of the Kuskokwim River and contains a large area suitable for settlement, though the river is too shallow to admit of navigation by large boats.

(4) *The Yukon District and Arctic Alaska.* This embraces all of the territory from the southern watershed of the Yukon basin to the Arctic Ocean. In the eastern portion it is mountainous. The Yukon receives two important tributaries: the Tanana from the south and the Porcupine from the north. Although the Yukon is one of the largest rivers of North America, it is so impeded by shoals and islands that it is navigable only for flat bottomed river steamers, which ascend as far as Selkirk, 1,500 miles. St. Michaels is the seaport for the Yukon district, and ocean going vessels transfer their lading to river steamers at this point.

The western coast of the district is indented by two large inlets: Norton Sound on the south and Kotzebue Sound on the north of Seward Peninsula, which extends to within 48 miles of East Cape in Kamchatka. Near Cape Nome, on the southern coast of this peninsula, are the Cape Nome gold fields. To the north of the Yukon the interior is an almost level plane, covered in many places with frozen tundras.

Climate. Each topographical district differs from the others in climate and soil. The coast district is protected from the winds from the north by the high mountain barrier that forms its inland boundary. It is also subject to the influence of the warm Pacific or Japan Current. For these reasons it has a much warmer climate than those portions of the eastern coast of the continent having the same latitude. The thermometer seldom rises above 80° or falls below zero. The condensation of the warm winds from the Pacific by the mountains causes an abundance of rain, and fogs usually prevail, except in Cook's Inlet, which for some reason is free from them. The hills and mountains as far as the snow line are covered with a dense growth of evergreen trees, most of which are suitable for lumber. Mingled with the evergreens are some of the more hardy deciduous trees. The temperature of the Alaskan and Aleutian district averages a little lower than that of the coast district, while that of the Kuskokwim has an average of zero for midwinter and of 50° for summer. The vast interior, both north and south of the Yukon, has an Arctic climate. The winters are cold and long and the summers short and warm. The Yukon is navigable only from June 15th to September 15th, and the harbors on Bering Sea are blockaded with pack ice for about the same length of time as the river remains frozen, though the temperature on Norton Sound is milder than in the interior.

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MINERALS. Much of the interior is still unexplored and the mineral resources are not fully known.

Coal. Coal has been discovered in the vicinity of Cape Lesbourn and in a number of other places along the Arctic coast, and it has occasionally been used by ships cruising in these waters. Coal is also found along the Yukon and on the Aleutian Islands, on Kenai Peninsula, at the head of Prince William Sound and in other places. The coal is a lignite and contains a good deal of sulphur, which renders it unsuitable for making steam, though it can be used for heating purposes.

Gold. Although the presence of gold along the beds of the rivers was known to the Russians, no prospecting occurred during their occupation of the country, as it was against the policy of the government. In 1870 Americans began prospecting and soon discovered placers and veins of varying richness. The most important of these was on Douglas Island, where a mining camp was soon opened and work on the placers was begun. Soon after, rich veins of quartz ore were discovered. Permanent works for operating the mines were erected and the town of Juneau was established. These mines have been operated with profit ever since, and many other paying mines have been opened up in their vicinity. On Baranov Island, near Sitka, around the head of Lynn Canal, around other islands and on the mainland, at the head of Cook's Inlet, and in other places the sand and gravel on the beach are found to contain gold in paying quantities. But the most remarkable development has been in the Yukon district, where gold was discovered in 1897. This discovery led to the prospecting of the entire valleys of the Yukon and its tributaries, and rich deposits were found both along the river beds and among the mountains. Following these discoveries was that on the north shore of Norton Sound, where the sands of the beach and along neighboring streams have proved extraordinarily rich. Since 1899 the output from these mines has been about \$7,000,000 a year. Successful mines are in operation near Dawson, Canada, and in a few other places. The annual output of gold for the territory is about \$8,000,000.

Other Minerals. Rich deposits of copper have been discovered in the Copper River country and on Prince of Wales Island, and silver ore occurs in a number of localities where gold is found; but lack of transportation facilities makes it impossible to work these ores with profit.

Vegetation. As already stated, the islands and mainland of the Coast District are covered with dense forests of evergreen trees, which extend up the mountains to the snow line. In these forests are found thousands of square miles of white pine, cedar, fir and Alaska spruce, all of which are valuable for lumber. West of Cross Sound and in the Kuskokwim valley the growth of trees is lighter, but the mountains and hills at the head of this valley are quite heavily timbered. The valley of the

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Yukon contains but few trees, but during summer sustains an abundant growth of grass and other herbage. Along the Copper River are also large areas which produce luxuriant growths of grass. The tundras north of the Yukon contain little but the Arctic flora.

Animals. The animals of Alaska are numerous, and if catalogued would make a long list. Commercially, a number of them are important on account of the value of their furs. These are the mink, Alaskan fox (white and blue fox), red and black foxes, the marten, the sea otter (now nearly extinct), and the fur seal. The seal fisheries are located on and around the Pribilof Islands and are under the control of the American Fur Company, which is restricted by the United States Government from taking over 30,000 seals a year. However, the capturing of the seals in the open sea by Canadian and Japanese vessels is depleting their numbers so rapidly that they will soon become extinct if the practice is continued. The common seal and the walrus are hunted by the natives, who make use of all parts of these animals for food, clothing and other domestic purposes. The reindeer and sledge dog are of great value to the inhabitants as beasts of burden. In summer many species of birds and insects are found.

Fisheries. The coast waters and rivers abound in fish. As yet only the salmon fisheries have been developed, and their output averages about \$7,000,000 annually. The headquarters of the industry are at Kodiak Island. The cod, halibut and herring fishing grounds are thought to be more extensive than those of the Atlantic coast, and in due time the taking of these fish will become an important industry.

Agriculture. Until recently Alaska has not been considered as a possible agricultural country, and it is too far north to ever attain to an important position in this industry. However, the possibilities are greater than were formerly supposed. The line which marks the northern limit of cereals extends across the territory from a little north of Eagle City to St. Michaels. South of this wheat, oats, rye and barley ripen, and the soil is of such fertility that it yields good crops. Garden vegetables are raised in the Yukon valley and as far north as Dawson. The abundance of wild grass assures a good hay crop, and live stock can be kept through the winter without difficulty. Large areas in the valleys of the Kuskokwim and Copper rivers and their tributaries are suitable for cultivation and as soon as needed land laws are enacted will undoubtedly be occupied. A number of stock growers from Montana and other mountain states are establishing ranches on the Aleutian Islands, where conditions are especially favorable to grazing.

Transportation. During the open season all ports have regular and frequent communication with the northern ports of the Pacific coast. Regular lines of steamers ply between Seattle, Valdez, Kodiak, St. Michaels and Nome. At St. Michaels these steamers make connection with the Yukon steamers, which ascend the river as far as Dawson. Other lines

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of steamers ply between Seattle and Sitka, Juneau, Skagway and other coast towns. A railway is in operation from Skagway through White Pass and is to be extended to Dawson. Most of this line is in Canadian territory. The Alaskan Central Railway has been projected and partially surveyed. It is to extend from Valdez through the Copper River valley to Tanana, thence westward to Nome, and a branch will also be built eastward to connect with the line from Skagway to Dawson.

Nome is connected with St. Michaels by cable and with Eagle City and Dawson by telegraph. In all there are now over 1,500 miles of telegraph lines in the territory, and through the Canadian line terminating at Eagle City the leading settlements are in communication with the rest of the world. The United States mail is now delivered regularly at all settlements, though during the severest winter months these deliveries are at long intervals.

Cities and Towns. Previous to the discovery of gold in 1897 Sitka and Juneau were the only towns of importance. Since then several towns have sprung up. Sitka, on Baranov Island, is the seat of government and oldest town. In 1900 it had a population of 1,390. Juneau, at the entrance of Taku Inlet, is the center of a good mining industry and has a population of 3,000. Skagway, at the head of Taku Inlet, is the seaport of the White Pass Railway, and Eagle City is on the Yukon at the point where it crosses the Canadian boundary. Nome, on Norton Sound, has sprung up since 1898, and now has a population of 25,000. It is by far the most important town in the territory. Most of these towns have good public schools, telephones, electric lights and other conveniences found in similar cities farther south.

Government. The civil code enacted by the Fifty-sixth Congress made Alaska an unorganized territory and divided it into three judicial districts, with courts at Juneau, St. Michaels and Eagle City. Towns of a certain size are allowed to organize and elect their own officers. But the judges of the district courts are empowered to appoint all commissioners, recorders, probate judges, justices of the peace and other officers connected with the administration of the laws. The mining laws of the United States are not well adapted to the country, and there is much litigation over claims. As yet, the land laws will not enable settlers to take up land, and settlement is retarded on this account.

Commerce. The commerce of the territory is growing rapidly. In 1892 the foreign trade, including exports and imports, amounted to \$28,366. In 1900 it was \$72,462, and for the fiscal year ending June 30, 1903, it was \$21,000,000, without the gold and silver.

Population. There are three native races in the territory: the Eskimos, who occupy the country north of the Yukon; the Athabaskan Indians, who inhabit the mountainous regions in the eastern portion, the valley of the Yukon, and extend southward as far as Cook's Inlet; and the Aleuts, who occupy the Aleutian Is-

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lands. The Thlinkeets, who formerly occupied the coast and islands from Puget Sound to Yakutat Bay, are nearly extinct. The census of 1900 gave a native population of 29,536, more than half of whom were Eskimos. The white population is now in excess of the native, and is steadily increasing. In 1900 the entire population was 63,592, and at the close of 1903 it was probably some over 90,000, at least 60,000 being white.

History. The peninsula and adjoining islands in Bering Sea were discovered in 1740 by Vitus Bering, a Danish navigator in the employ of Russia. The southern coast was visited by Captain Cook in 1778. The first settlement was made at Three Saints on Kodiak Island in 1784. In 1799 the Russian-American Fur Company was organized and, under the management of Alexander Baranov, began a trade which in a few years included Japan and China as well as Alaska. Baranov founded Sitka and gave his name to the island upon which the town was built. Under his direction Sitka became a thriving manufacturing town, and it was from the Sitka shops that the early settlers of California obtained their tools and many other supplies. Baranov also established numerous missions of the Greek Church, a number of which are still continued. Notwithstanding the immense traffic of the Fur Company, the territory never paid expenses, and in 1867 Russia sold it to the United States for \$7,200,000. Jurisdiction was assumed in October, and the following year the laws of the United States became operative throughout the territory.

No survey had been made for the purpose of fixing the boundary between Alaska and the British territory to the east, and the supposed worthlessness of the country caused this matter to be delayed. When the richness of the Klondike region became known, however, the Canadian authorities pressed the boundary question upon the attention of both the United States and Great Britain. In 1898 a British-American Commission met in Quebec for the purpose of adjusting this and other differences between Canada and the United States, but adjourned without accomplishing anything. But the boundary dispute continued to be pressed by the Canadian Government, who wanted the question arbitrated by an umpire chosen from some European country. To this proposition the United States would not assent, but by a treaty signed in March, 1903, it was agreed between the United States and Great Britain to have the question adjudicated by a joint commission composed of three members each from the United States and Great Britain. According to the terms of the treaty, a decision concurred in by four members of the commission was to be binding. The controversy arose over the interpretation of the treaty between Russia and Great Britain, negotiated in 1825, which specified that the boundary should follow the windings of the coast and should be fixed ten marine leagues inland.

Canada claimed:

- (1) That the word *coast* used in the treaty

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means a line running along the adjoining islands instead of the mainland.

(2) That what was referred to as the Portland Canal in the treaty of 1825 is what is now known as Behm Canal, a channel between Prince of Wales Island and an island lying east of it.

(3) That the treaty indicated a line drawn northward through Behm Canal to the 56th degree of north latitude, instead of up Portland Canal to its head, thence to the 56th parallel.

(4) That in establishing the boundary ten marine leagues inland from the head of Lynn Canal, some points on this line would be located more than twenty leagues from the coast, which is not in accordance with the terms of the treaty.

(5) That the United States had established settlements within Canadian territory, and by so doing had violated that clause of the treaty which stipulates that neither of the contracting parties shall make settlements within the territory of the other.

The United States claimed:

(1) That the word *coast* as used in the treaty means the shore of the mainland and not the outer coast of the islands.

(2) That the Portland Canal named in the treaty is the inlet now known as Portland Canal.

(3) That according to the provisions of the treaty, the boundary should follow Portland Canal to its head, thence northward to the 56th parallel, from which point it should follow the sinuosities of the coast at a distance of ten marine leagues inland until it reached the 141st meridian of longitude west from Greenwich.

(4) That the undisputed possession of this territory by Russia from 1825 until the sale of Alaska to the United States, and by the United States since that purchase until 1896, is conclusive evidence that the boundary established is in accordance with the terms of the treaty.

Both parties agreed that the United States was entitled to and received all rights of Russia, and no more.

The personnel of the commission was as follows: On the part of Great Britain, Lord Alverstone, Chief Justice of England; Sir L. A. Jetté, Lieutenant Governor of Quebec; and Hon. A. B. Aylesworth of Canada. On the part of the United States, Hon. Elihu Root, Secretary of War; Senator Henry Cabot Lodge; and Ex-Senator George Turner.

The commission met in London, September 3, 1903, and chose Lord Alverstone chairman. Elaborate written arguments were first submitted by both sides. Later these arguments were supplemented by a direct presentation of the case. Each party based its claims on the treaty of 1825, and the transactions leading up to that convention, some of these being as old as Russia's occupation of the country.

The discussion established beyond a doubt, with the majority of the commission, the following facts:

- (1) That when the treaty of 1825 was made, there had been no careful survey of the interior of that portion of North America, though

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the coast was well known to navigators and traders.

(2) That the boundary line established by this treaty was based on the maps of Vancouver, which had been in common use for a quarter of a century. While these maps did not pretend to be accurate in their location of moun-

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lowed, until the purchase of Alaska by the United States, there had been no difference of opinion expressed by any party as to the meaning of the treaty, or the principles upon which the boundary should be actually fixed, whenever the time should come for making survey and erecting monuments. On these points



tain ranges, they all plainly indicated a rather regular range of mountains situated some distance inland and leaving a strip of land some thirty miles wide between them and the shore. The treaty plainly said that the boundary line should follow the peaks of this range of mountains, provided the surveyors found that it existed. But in lack at any point of such a range, the line was to be marked at a distance of ten marine leagues from the shore.

(3) That during the entire period that fol-

lowed, English, Russian and American maps agreed.

(4) That it was with this understanding that the United States purchased Alaska in 1867, and that until the discovery of gold in the Klondike region, no one had questioned the boundary as established by the treaty. This question was raised by Canada after the control of the Hudson Bay Territory had passed under her jurisdiction.

The commission concluded its labor on October 20th. In rendering the decision, Lord

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Alverstone sided with the American commissioners. The boundary line established is substantially that claimed by the United States. The mountain peaks selected as marking the line of separation are those beginning at the head of Portland Canal and running along the high mountains on the outer edge of the mountains shown in the maps of the survey of 1893. Following this the boundary extends to Mount Whipple and thence along what is known as the Hunter line of 1878, crossing the Stikene River about twenty-four miles from its mouth. Thence it extends northerly along the high peaks to Kate's Needle, and from Kate's Needle to the Devil's Thumb. From the vicinity of the Devil's Thumb, the line runs to the continental watershed, thence through White and Chilkoot Passes westerly to a mountain indicated as 5,800 feet. From this point it passes in a somewhat curved line across the head of the glaciers to Mount Fairweather.

By the decision of the commission, the Canadian outpost on the upper Chilkoot River is in British territory, and the mining camps of Porcupine and Glacier creek are in American territory. At the outlet of Portland Canal, the boundary is changed from the south to the north channels, giving Canada two islands opposite Fort Stimpson, which have been occupied by the United States. A complete and final survey will have to be made by surveyors of both governments acting conjointly before monuments marking the location of the boundary can be erected. The Canadian commissioners refused to sign the report.

Alassio, an attractive health resort on the Gulf of Genoa, in the Riviera, Liguria, Italy, 57 miles s. w. of Genoa. Picturesque wooded mountains protect it on the north. The natives are chiefly fishermen. Population about 5,600.

Alatau (ah''la-tow'), a name given to the range of high mountains separating Turkestan and Mongolia, and situated at the extreme north of the Central Asian great tableland. There are three sub-ranges, the Dzungarian, the Trans-Ili, and the Kuznets Alatau, all of which are centered upon Lake Issik Kul. The highest point of the range is about 15,000 feet above sea level.

Alatyr (ah''la-teer'), a Russian city, the chief town in the government district of Simbirsk. It is on the Sura River, 107 miles n. w. of Simbirsk. It has two cathedrals, several monasteries, a hospital, good schools, etc. Industries: milling, brewing and bricklaying. It was founded by Ivan the Terrible in 1582. Pop. 1897, 11,100.

Alaux (a''lo'), **JEAN**, called **LE ROMAIN** (1786-1864), a French painter of historical subjects. His best work was *Burial of our Lord*. He has twenty-nine canvasses in the museum at Versailles.

Alava (ah''la-va), **DON MIGUEL RICARDO DE** (1771-1843), a Spanish soldier born at Vittoria. He was of noble birth, and served successively in the navy and land service of Spain. He was fickle in his political allegiance, attaching him-

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self successively to Ferdinand VII of Spain, the French, the English and the Spanish again. Later he fought against Ferdinand, and again fought for his restoration to the throne. He fled to England but was recalled by Maria Christina and filled several important diplomatic posts. He died in France, whence he had retired upon refusing to swear allegiance to the Constitution of 1812.

Alba, the name of several towns in ancient Italy, the most celebrated of which was Alba Longa, a city of Latium, according to tradition built by Ascanius, the son of Aeneas, 300 years before the foundation of Rome, at one time the most powerful city of Latium. In later times its site became covered with villas of wealthy Romans.

Albani (ál-bā' nē), **FRANCESCO** (1578-1660), a famous Italian painter. Among the best known of his compositions are the *Sleeping Venus*, *Diana in the Bath*, *Danae Reclining*, *Galatea on the Sea*, *Europa on the Bull*.

Albani, **MME. (MARIE EMMA LAJUNESSE)**, born in Montreal, Canada, in 1851. She sang in Albany, N. Y., in the Catholic cathedral, and funds were procured to send her to Europe to complete her musical education. She sang in 1870 at Messina, Sicily, and adopted the name of Albani in remembrance of the city of Albany. Mme. Albani has sung in opera in London, Florence, St. Petersburg, and all the principal cities of this country. In 1889, she took part in the historic operatic season at the Chicago Auditorium. She died in 1894.

Alba'nia, an extensive region in the s. w. of Turkey in Europe, stretching along the coast of the Adriatic for about 290 mi., and having a breadth varying from about 90 to about 50 mi. Albania has many species of oak, the poplar, hazel, plane, chestnut, cypress, and laurel. The vine flourishes, together with the orange, almond, fig, mulberry, and citron; maize, wheat and barley are cultivated. Its fauna comprises bears, wolves, and chamois; sheep, goats, horses, asses, and mules are plentiful. The chief exports are live stock, wool, hides, timber, oil, salt-fish, cheese, and tobacco. The chief ports are Prevesa, Avlona, and Durazzo. The population, about 1,400,000, consists chiefly of Albanians, or, as they call themselves, mountaineers, with a certain number of Greeks and Turks. They are only half civilized, are divided into a number of clans, and bloody feuds are still common among them. They belong partly to the Greek, partly to the Roman Catholic Church, but the great majority are Mohammedans. Though their country became a province of the Turkish dominions in the fifteenth century, they still maintain a certain degree of independence, which the Porte has never found it possible to overcome.

Alba'no, a city and lake in Italy, the former about 15 mi. s. e. of Rome, and on the west border of the lake, amid beautiful scenery, with remarkable remains of ancient structures. Pop. 6,493.—The lake, situated immediately beneath the Alban Hill, is of an oval form, 6 mi. in circumference, surrounded by steep

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banks of volcanic tufa, 300 or 400 feet high, and discharges its superfluous waters by an artificial tunnel at least 2,000 years old.

Al' bany, the original Celtic name probably at first applied to the whole of Britain, but latterly restricted to the Highlands of Scotland. It gave the title of duke formerly to a prince of the blood-royal of Scotland. Latterly the title has belonged to members of the British royal family.

Albany, county seat of Albany co., N. Y., and state capital; situated on the w. bank of the Hudson, 145 m. n. of New York and 164 m. w. of Boston. Albany is six miles below the head of navigation on the Hudson, is the terminus of the great Erie Canal and of the Champlain Canal; the terminus of the Boston and Albany R. R. and the division terminus on the mainlines of the West Shore, the New York Central and Hudson River and the Delaware and Hudson railroads. A French trading post was set up on the present site of the city as early as 1540, but the place was not permanently settled until after the discovery of the region by Henry Hudson. In 1614, Dutch traders built Fort Orange near the site of the present state Capitol. Indian wars broke up the settlement for a time, but in 1629, settlers came over from Holland and thereafter the colony flourished. Albany received a city charter in 1684, and its first mayor was Peter Schuyler. During the struggle between the English and French in America and in the American Revolution, the city was a place of strategic importance, and in 1797 was made the permanent capital of the state. In the twenty years following the opening of the Erie Canal, it almost trebled its population. Since then, the development has been steady. Among the most important industries are the lumber trade, iron, wood, brass and tobacco manufactures, and the manufacture of shirts, collars, cuffs, caps, knit goods and carriages and wagons. The finest building is the Capitol, built of Maine granite in the Renaissance style. Other important buildings are the City Hall, Federal Building, Penitentiary, Museum of Natural History, Dudley Astronomical Observatory, the State Arsenal, the new Union Railway Station, the Cathedral of the Immaculate Conception, and St. Peter's Church. Among other places of interest is the old Schuyler mansion. A state normal school and the law and medical departments of Union University are located here. Pop. 1900, 94,151.

Al' batross, a large marine swimming bird of several species, of which the wandering albatross is the best known. The bill is straight and strong, the upper mandible hooked at the point and the lower one truncated; there are three webbed toes on each foot. The upper part of the body is of a grayish brown, and the belly white. It is the largest sea-bird known, some measuring 17½ feet from tip to tip of their expanded wings. They abound at the Cape of Good Hope and in other parts of the southern seas, and in Behring's Straits, and have been known to accompany ships for whole days without ever resting on the waves. The

Albigenses

albatross is met with at great distances from the land, settling down on the waves at night to sleep. It is exceedingly voracious whenever food is abundant, gorging to such a degree as to be unable to fly or swim. It feeds on fish, carrion, fish-spawn, oceanic mollusca, and other small marine animals. Its voice is a harsh, disagreeable cry. Its eggs are larger than those of a goose. It lays but one egg, on the ground, where it makes a kind of nest by scraping the earth around it. The young is entirely white, and covered with a woolly down, which is very beautiful.

Albert (1828-1902), King of Saxony, succeeded to the throne in 1873. He married Caroline, Princess Vasa, of Sweden, in 1853. He supported Prussia in the war with France and was made a field-marshal in the German Army.

Albert Edward. See *Edward VII.*

Al' bert, FRANCIS-AUGUSTUS-CHARLES-EMMANUEL, Prince of Saxe-Coburg-Gotha, late Consort of Queen Victoria, of England, was the second son of Ernest, Duke of Saxe-Coburg-Gotha, b. 1819. In 1840 he became the husband of the queen of England. The name of Prince A. will ever be remembered as that of a true friend of progress and the people. He was an earnest promoter of science and art, and was the first to suggest the International Exhibition of 1851. The manner in which he filled his somewhat anomalous position as the Queen's consort was marked by the greatest sagacity and tact. His death, Dec. 14, 1861, caused the most profound grief throughout the world. A collection of the speeches of Prince A. was published soon after his death.

Alber'ta, formerly one of the districts of the Northwest Territories of Canada, bounded by Assiniboia, Saskatchewan, British Columbia, the U. S. and Athabasca. In 1905 from the districts known as the Northwest Territories there were formed two new provinces, Alberta and Saskatchewan, each of large dimensions and destined to a prosperous future.

Albert Nyan'za, a lake of Africa, one of the head-waters of the Nile. It abounds with fish, and its shores are infested with crocodiles and hippopotami. It receives the Victoria Nile from the Victoria Nyanza, and the White Nile issues from its northern extremity.

Albigenses (al-bi-jen'séz), a name applied to a religious sect which sprang up in the south of France during the thirteenth century. They were so called from the district, Albigeois, where they first appeared. The Albigenses professed belief in doctrines at variance with the Church of Rome. Accordingly, Pope Innocent III preached a crusade against them. The Albigenses persisted, however, in their heresy and slew the papal legate, Pierre de Castelnau. War ensued, in which the papal forces were led by Simon de Montfort, father of the English Earl de Montfort, and the Albigenses by Count Raymond of Toulouse; the struggle began in the year 1209. After many thousands had perished on both sides, a peace was concluded in 1229. Toulouse lapsed to the crown of France, and thus that country acquired the Mediterranean coast. The rem-

Albina

nants of the Albigenes left France for the east, most of them settling in Bosnia. By the middle of the thirteenth century, the name Albigenes had almost entirely disappeared. With them the poetry of the Troubadours also became practically extinct.

Albinos (al-bi' nōz), the name given to those persons from whose skin, hair, and eyes, in consequence of some defect in their organization, the dark coloring matter is absent. The skin of albinos, therefore, whether they belong to the white, Indian, or negro races, is of a uniform pale milky color, their hair is white, while the iris of their eyes is pale rose color, and the pupil intensely red, the absence of the dark pigment allowing the multitude of blood-vessels in these parts of the eye to be seen. For the same reason their eyes are not well suited to endure the bright light of day, and they see best in shade or by moonlight. The peculiarity of *albinism* is always born with the individual, and is not confined to the human race, having been observed also in horses, rabbits, rats, mice, etc., birds (white crows or black-birds are not particularly uncommon), and fishes.

Al' bion, the earliest name by which the island of Great Britain was known, employed by Aristotle, and in poetry still used for Great Britain. The same word as *Albany*, *Albyn*.

Albuera (âl-bu-ä' rä), a village of Spain, in Estremadura, 12 mi. s. s. e. of Badajoz. A battle was fought here, May 16, 1811, between the army of Marshal Beresford (30,000) and that of Marshal Soult (25,000), when the latter was obliged to retreat to Seville, leaving Badajoz to fall into the hands of the allies.

Albu' men (or Albumin), a substance, or rather, group of substances, so named from the Latin for the white of an egg, which is one of its most abundant known forms. It may be taken as the type of the protein compounds or the nitrogenous class of food stuffs. One variety enters largely into the composition of the animal fluids and solids, is coagulable by heat at and above 160°, and is composed of carbon, hydrogen, nitrogen, and oxygen, with a little sulphur. It abounds in the serum of the blood, the vitreous and crystalline humors of the eye, the fluid of dropsy, the substance called coagulable lymph, in nutritive matters, the juice of flesh, etc. The blood contains about 7 per cent. of albumen. Another variety called vegetable albumen exists in most vegetable juices and many seeds, and has nearly the same composition and properties as egg albumen. When albumen coagulates in any fluid it readily encloses any substances that may be suspended in the fluid. Hence it is used to clarify syrupy liquors. In cookery white of eggs is employed for clarifying, but in large operations like sugar-refining the serum of blood is used. From its being coagulable by various salts, and especially by corrosive sublimate, with which it forms an insoluble compound, white of egg is a convenient antidote in cases of poisoning by that substance. With lime it forms a cement to mend broken ware.

Alchemy

In botany the name albumen is given to the farinaceous matter which surrounds the embryo, the term in this case having no reference to chemical composition. It constitutes the meat of the cocoanut, the flour or meal of cereals, the roasted part of coffee, etc.

Albuquerque (âl-bu-kerk' ä), ALFONSO DE (1452-1515), an eminent Portuguese admiral. His career was extremely successful, he having extended the Portuguese power over Malabar, Ceylon, the Sunda Islands, and the Peninsula of Malacca.

Albuquerque (al-bu-kerk-a), capital of Bernalillo county, N. M., 528 miles south of Denver. Railroads, A. T. & S. F. and Atlantic & Pacific. Industries: car shops, foundries, and machine shops, ice factories, breweries, a broom factory and a wool scouring establishment. The town has an extensive wholesale trade; also a public library, paved streets, electric lights and water works. Seat of the University of New Mexico. Population 1900, 12,042.

Albur' num, the soft white substance which, in trees, is found between the liber or inner bark and the wood, and, in progress of time acquiring solidity, becomes itself the wood. A new layer of wood, or rather of alburnum, is added annually to the tree in every part just under the bark.

Alcæ' us, one of the greatest Grecian lyric poets, was born at Mitylene, in Lesbos, and flourished there at the close of the seventh and beginning of the sixth centuries B. C.; but of his life little is known. A strong manly enthusiasm for freedom and justice pervades his lyrics, of which only a few fragments are left. He wrote in the Æolic dialect, and was the inventor of a meter that bears his name, which Horace has employed in many of his odes.

Alcala' de Henares (en-ä' res), a beautiful city of Spain, 16 mi. e. n. e. of Madrid. It has an imposing appearance when seen from some distance, but on nearer inspection is found to be in a state of decay. There was formerly a university here, at one time attended by 10,000 students; but in 1836 it was removed with its library to Madrid. Cervantes was born here. Pop. 12,317.

Alces' tis, in Greek mythology, wife of Admetus, king of Thessaly. Her husband was ill, and, according to an oracle, would die unless some one made a vow to meet death in his stead. This was secretly done by Alcestis, and Admetus recovered. After her decease Hercules brought her back from the infernal regions. See *Mythology*.

Al' chemistry (or Alchymy), the art which in former times occupied the place of, and paved the way for, the modern science of chemistry (as astrology did for astronomy), but whose aims were not scientific, being confined solely to the discovery of the means of indefinitely prolonging human life, and of transmuting the baser metals into gold and silver. Among the alchemists it was generally thought necessary to find a substance which, containing the original principle of all matter, should possess the

power of dissolving all substances into their elements. This general solvent, which at the same time was to possess the power of removing all the seeds of disease out of the human body and renewing life, was called the *philosopher's stone*, and its pretended possessors were known as *adepts*. It is thought that alchemy originated in Egypt. From Egypt the art was carried to Arabia, where in the eighth century a school of alchemy published the first known work on chemistry proper. From Arabia alchemy found its way into Europe, where the earliest authentic works on the subject are those of Roger Bacon and Albertus Magnus, written in the thirteenth century. Thomas Aquinas and Raymond Lully are also great names in the annals of alchemy. But more famous than all the others was Paracelsus, a Swiss physician whose investigations gave a remarkable impetus to the development of pharmaceutical chemistry. He was followed by Lavoisier, Priestley and Scheele, who, by the use of balances, tested the results of alchemy and formulated the fundamental ideas of modern chemistry.

Alcibi'ades (dēz) (B. C. 450-404), an Athenian of high family and of great abilities, but of no principle, b. at Athens, being the son of Cleinias, and a relative of Pericles. In youth he was remarkable for the dissoluteness of his manners. He came under the influence of Socrates. After the death of Cleon he attained a political ascendancy which left him no rival but Nicias. He played an important part in the Peloponnesian war. In 415 he advocated the expedition against Sicily, and was chosen one of the leaders, but before the expedition sailed he was charged with profaning and divulging the Eleusinian Mysteries. Rather than stand his trial he went over to Sparta, divulged the plans of the Athenians, and assisted the Spartans to defeat them. He soon left Sparta and took refuge with the Persian satrap Tissaphernes. He began to intrigue for his return to Athens, offering to bring Tissaphernes over to the Athenian alliance, and latterly he was recalled and his banishment canceled. He, however, remained abroad in command of the Athenian forces, and took Chalcedon and Byzantium. In B. C. 407 he returned to Athens, but in 406, he was deprived of his command. He again sought refuge in Phrygia, and here he was assassinated.

Al'cohol, the purely spirituous or intoxicating part of all liquids that have undergone vinous fermentation, extracted by distillation—a limpid colorless liquid, of an agreeable smell and a strong pungent taste. When brandy, whisky, and other spirituous liquors, themselves distilled from cruder materials, are again distilled, highly volatile alcohol is the first product to pass off. Charcoal and carbonate of soda put in the brandy or other liquor, partly retain the fusel-oil and acetic acid it contains. The product thus obtained by distillation is called *rectified spirits* or *spirits of wine*, and contains from 55 to 85 per cent. of alcohol, the rest being water. By distilling rectified spirits over carbonate of potassium,

powdered quicklime, or chloride of calcium, the greater part of the water is retained, and nearly pure alcohol passes over. It is only, however, by very prolonged digestion with desiccating agents and subsequent distillation that the last traces of water can be removed. The specific gravity of alcohol varies with its purity, decreasing as the quantity of water it contains decreases. By simple distillation the specific gravity of alcohol can scarcely be reduced below .825 at 60° Fahr.; by rectification over chloride of calcium it may be reduced to .794; as it usually occurs it is about .820. Alcohol is composed of carbon, hydrogen, and oxygen, in the proportions of 2 to 6 to 1 respectively. Under a barometric pressure of 29.5 inches it boils at 173° Fahr.; in the exhausted receiver of an air-pump it boils at ordinary temperatures. Its very low freezing-point renders it valuable for use in thermometers for very low temperatures. Alcohol is extremely inflammable, and burns with a pale-blue flame, scarcely visible in bright daylight. It occasions no carbonaceous deposit upon substances held over it, and the products of its combustion are carbonic acid and water. The steady and uniform heat which it gives during combustion makes it a valuable material for lamps. It dissolves the vegetable acids, the volatile oils, the resins, tan, and extractive matter, and many of the soaps; the greater number of the fixed oils are taken up by it in small quantities only, but some are dissolved largely. When alcohol is submitted to distillation with certain acids a peculiar compound is formed, called *ether*. It is alcohol which gives all intoxicating liquors the property whence they are so called. Alcohol acts strongly on the nervous system, and though in small doses it is stimulating and exhilarating, in large doses it acts as a poison. In medicine it is often of great service.

The name alcohol is also applied in chemistry to a large group of compounds of carbon, hydrogen, and oxygen, whose chemical properties are analogous to that of common or ethylic alcohol.

Alco'ran. See *Koran*.

Alcott, AMOS BRONSON (1799-1888), born in Wolcott, Conn. In 1828 he went to Boston and organized a school on a novel plan. Later Mr. Alcott went to Concord, Mass., where he studied natural theology, reform in education and civil and social institutions, and began to lecture. In 1842 he went to England to confer with educational and social reformers. On his return to America he again settled in Concord. Among his publications are, *Tablets* (1868); *Concord Days* (1872); *Table Talk* (1877); and *Sonnets and Canzonets* (1877).

Alcott, LOUISA MAY (1832-1888), author, born in Germantown, Penn. She was the daughter of Amos Bronson Alcott. For a number of years she wrote for periodicals, while she was occupied as a school-teacher. In 1862 she went as a volunteer nurse in military hospitals. In 1866 Miss Alcott visited Europe, and on her return wrote *Little Women*, a book that at once established her popularity as a writer.

Alcuin

Some of her other publications have been almost equally popular.

Alcuin (alk'win) (735-804), a learned Englishman, the confidant, instructor, and adviser of Charles the Great (Charlemagne). Charlemagne became acquainted with him at Parma, invited him in 782 to his court, and made use of his services in his endeavors to civilize his subjects. Charlemagne established at his court a school, called *Schola Palatina*, or the Palace School. Most of the schools in France were either founded or improved by him; thus he founded the school in the abbey of St. Martin of Tours, in 796. Alcuin left the court in 801, and retired to the abbey of St. Martin of Tours, but kept up a constant correspondence with Charles to his death. He left works on theology, philosophy, rhetoric, also poems and letters, all of which have been published.

Alden, JOHN, one of the Pilgrim Fathers landing in Massachusetts in 1620. The romantic incident of his courtship of Priscilla as the emissary of Miles Standish has been preserved in Longfellow's verse. He died 1687.

Alder (al'dér), a genus of plants, of the birch order, consisting of trees and shrubs inhabiting the temperate and colder regions of the globe. Common alder is a tree which grows in wet situations in the U. S., Europe, and Asia. Its wood, light and soft and of a



Common Alder.

reddish color, is used for a variety of purposes, and is well adapted for work which is to be kept constantly in water. The roots and knots furnish a beautifully-veined wood, well suited for cabinet work. The charcoal made from the wood is used in manufacturing powder. The bark is used in tanning and leather dressing, and by fishermen for staining their nets. This and the young twigs are sometimes employed in dyeing, and yield different shades of yellow and red. With the addition of copperas it yields a black dye.

Al'derney, an island belonging to Britain off the coast of Normandy, 10 mi. due west of Cape La Hague, and 60 from the nearest point of England, the most northerly of the Channel Islands, between 3 and 4 miles long, and about $1\frac{1}{2}$ broad. About a third of the island is occupied by grass lands; and the Al-

Alembert

derney cows, a small-sized but handsome breed, are famous for the richness of their milk. Climate is mild and healthy. The *Race of Alderney*, the strait between the coast of France and this island. Pop. 2,039.

Aldershot (al'dér), a town and military station in England. The camp was originated in 1854 by the purchase by government of a tract of moorland known as Aldershot Heath, on the confines of Surrey, Hampshire, and Berkshire. Pop. (including military) 25,595.

Al'dine Editions, the name given to the works which proceeded from the press of Aldus Manutius and his family at Venice (1490-1597). They have gained the respect of scholars and the attention of book-collectors. Many of them are the first printed editions of Greek and Latin classics. Others are texts of the modern Italian authors. These editions are of importance in the history of printing. Aldus had nine kinds of Greek type, and fourteen kinds of Latin type.

Aldrich, NELSON WILMARTH, b. in R. I., 1841; was a member of the assembly, 1875-76, in the latter year was a speaker in the House of Representatives. He was elected to Congress in 1878 and 1880. In 1881 he was elected to the U. S. Senate as a Republican to succeed General Burnside, and was re-elected in 1886, 1892 and 1898.

Ald'rich, THOMAS BAILEY, an American poet and writer of prose tales, mostly humorous, born in 1836, was a short time in a mercantile house, but soon adopted literature as a profession, and was for a time editor of the *Atlantic Monthly*. He has written in verse: *The Bells*; *Ballad of Baby Bell*; *Pampinea and other Poems*; *Cloth of Gold and other Poems*; *Flower and Thorn*; in prose, *Daisy's Necklace*; *Story of a Bad Boy*; *Marjory Daw*; *Prudence Palfrey*, etc.

Aldridge, IRA (1804-1867), a negro actor, born at Belair, Md., died in Lodez, Poland. He was educated for a preacher, but united with an amateur dramatic company of his race, where he showed marked ability. His dramatic aspirations were interrupted by friends, and he went to England to complete a ministerial education. But in London the youth made his *début* at the Royalty theater as *Othello*, *the Moor of Venice*, and met with success. Later he appeared at Belfast, Ireland. In 1833 Aldridge appeared at Covent Garden theater in London, and in 1848 at the Surrey theater. He played for three years in Germany, and in 1857 visited Sweden. He received several honors in Europe.

Alecto, in Greek mythology, one of the Furies.

Alembert (â-lâm-bâr), JEAN DE ROND D' (1717-1783), a French mathematician and philosopher. He was the illegitimate son of Madame de Tencin. His parents never publicly acknowledged him, but his father settled upon him an income of 1,200 livres. He entered the College Mazarin at the age of twelve, and studied mathematics with success. Having left college he studied law and became an advo-

Alemtejo

cate, but did not cease to occupy himself with mathematics. A pamphlet on the motion of solid bodies in a fluid, and another on the integral calculus, which he laid before the Academy of Sciences in 1739 and 1740, showed him in so favorable a light that the Academy received him in 1741 into the number of its members. He published his famous work on dynamics, *Traité de Dynamique* (1743); and that on fluids, *Traité des Fluides*. He also took a part in the investigations which completed the discoveries of Newton respecting the motion of the heavenly bodies. He took part in the celebrated *Encyclopédie* for which he wrote the *Discours Préliminaire*, and almost all the mathematical articles. He received an invitation from the Russian empress Catherine II to go to St. Petersburg, and Frederick the Great invited him to Berlin, but in vain. From Frederick, however, he accepted a pension. There was an intimate friendship between him and Voltaire.

Alemtejo (â-lân-tâ'zhô), the largest province of Portugal, and the most southern except Algarve. Area 19,255 sq. mi.; pop. 367,169. The capital is Evora.

Alençon (â-lân-sôn), a town of France, capital of department Orne, on the right bank of the Sarthe, 105 mi. w. by s. of Paris; has a fine Gothic church (fifteenth century), and interesting remains of the old castle of the dukes of d'Alençon. Alençon was long famed for its point-lace, called "point d'Alençon." Fine rock-crystal, yielding the so-called "diamants d'Alençon," is found in the neighboring granite quarries. Pop. 17,237. — **Alençon**, a dukedom, became united with the crown in 1221. The first duke of the name lost his life at the battle of Agincourt in 1415; another, called Charles IV, married the celebrated Margaret of Valois, sister of Francis I.

Alep'po, a city of Asiatic Turkey, in north Syria, 195 mi. n. n. e. of Damascus. Previous to 1822 Aleppo contained about 100 mosques, but in that year an earthquake laid the greater part of them in ruins, and destroyed nearly the whole city. The aqueduct built by the Romans is the oldest monument of the town. It has a trade in wool, cotton, silk, wax, skins, soap, tobacco, etc. By the Greeks and Romans it was called *Berea*. It was conquered by the Arabs in 638, and its original name *Chalybon* was then turned into *Haleb*, whence the Italian form *Aleppo*. Its population is now estimated at over 100,000, of whom perhaps 25,000 are Christians. The language generally spoken is Arabic.

Alessan'dria, a town and fortress in north Italy, capital of the province of the same name; was built in 1168 by the Cremonese and Milanese, and was named in honor of Pope Alexander III, who made it a bishop's see. It has a cathedral, important manufactures of linen, woolen, and silk goods, and an active trade. Pop. 30,761.

Aletsch-glacier, the greatest glacier in Switzerland, canton Vaud, a prolongation of the immense mass of glaciers connected with

Alexander

the Jungfrau, the Aletschhorn (14,000 ft.), and other peaks; about fifteen miles long.

Aleu'tian Islands, a chain of about eighty small islands belonging to the U. S. See *Alaska*.

Alexander the Great, king of Macedon (356-323 B. C.), the greatest character in history before the Christian era. In early youth Alexander gave evidence of invincible courage, wonderful strength and endurance, and boundless ambition. At the age of 13 he became a pupil of Aristotle. During the lifetime of his father, Philip of Macedon, he shared in the wars for the supremacy of Macedon over the neighboring states of Greece. On the assassination of his father (336), Alexander came to the throne, at the age of twenty. He put to death several of the murderers of his father, and the latter's second wife and her infant son. The conditions under which Alexander came to the throne were far from favorable. He at once began a series of conquests which filled his reign of a little more than twelve years. The first two years were occupied in subduing the revolting cities of Greece and hostile tribes beyond the northern frontier of Macedonia. It was reported that Alexander had been slain, and a considerable revolt against the Macedonian yoke was begun anew in Greece, with Athens and Thebes as its center. Alexander appeared before the latter city. The allies of Thebes, including Athens, deserted her and the city was taken by storm. The famous city was totally destroyed, the house of the poet Pindar alone being spared. The remaining states of Greece were pardoned.

Alexander set out in the spring of 334 for the conquest of the Persian Empire. With an army of 35,000 he crossed the Hellespont, and at the Granicus he totally defeated a Persian force, thereby opening the gate to all Asia Minor. The next year (333) the invading force met a vast Persian army numbering 600,000 on the plain of Issus. The Persians were again routed. Alexander next turned his attention to Phœnicia. The whole of Syria and Phœnicia submitted to him excepting only the famous city of Tyre, which was taken after a siege of seven months (332). The population of 8,000 was exterminated. The capture of Tyre is considered the greatest of Alexander's military operations. The next conquest was that of Egypt. At one of the mouths of the Nile the conqueror founded the city of Alexandria, which became so important a factor in the commerce of the Mediterranean. He next proceeded to the famous temple of Zeus Ammon in the Libyan desert. Alexander now turned his army eastward, to complete his overthrow of the Persian Empire. At Arbela, he met the army of the Persians, numbering more than 1,000,000, and fought one of the decisive battles of the world (331). With his army of 47,000 Alexander routed the Persians, and King Darius III met his death. He entered Babylon and Susa, taking in the latter city the royal treasure of silver and gold. Alexander was now regarded by himself and by the Persians as the successor of Darius. The vic-

Alexander

torious army was next led northward for the subjugation of various tribes about the Caspian Sea, and thence across the Hindu Kush into Bactria and Sogdiana (329-328). In 327 Alexander led his army to India, where all the native princes submitted except Porus, a powerful king north of the Indus, who was defeated. Alexander rediscovered the sea-route from the Indus to the Euphrates via the Indian Ocean, an achievement of great importance for the commerce of India. He made Babylon the capital of his vast empire. By means of colonies and intermarriage the peoples of Europe and Asia were to be fused into a single great nation, having common laws, language, and ruler. He himself married a daughter of King Darius, and 10,000 of his soldiers took Asiatic wives. In the midst of his vast projects Alexander was seized by a fever and died at Babylon. Of the generals among whom his vast domain was divided, the most famous was Ptolemy, who founded in Egypt the line of rulers of that name.

Alexander's title to greatness lies in his military achievements. His insatiate vanity and unchecked excesses are a serious blemish. His uncontrolled passion led him to commit deeds, such as the murder of his dearest friend, Clitus, which he bitterly repented. He never asked his soldiers to do what he would not do himself. He was a man of fine tastes and a liberal patron of art, philosophy, and literature. The effects of his conquests were, to end the struggle between Greece and Persia, to spread Hellenic civilization over Egypt and western Asia, while to the Greeks came the wealth and the vices of the Orient.

The story of Alexander's life and conquests is told in many ancient annals, and in the romances and legends of many nations.

Alexander, the name of eight popes, the earliest of whom, Alexander I, is said to have reigned from 109 to 119. The most famous is ALEXANDER VI (Borgia), (1431-1503), who was born at Valencia, in Spain. He was, in his early youth, a handsome and gallant courtier, practiced alike in all the vices and graces of his time. But he soon developed remarkable executive ability and at the age of twenty-five was appointed a cardinal by his uncle, Pope Calixtus III. At the death of Innocent VIII he became pope. He set himself the task of reducing the power of the Italian princes and increasing the papal revenues. Endowed with sagacity and fearlessness, he accomplished all he undertook. Among the events of his reign are the introduction of the *Index Expurgatorius* (index of prohibited books), the partition of the New World between Portugal and Spain, and the death of Savonarola.—ALEXANDER VIII, the last pope of the name, ruled from 1689 to 1691. He was a Venetian and assisted the Venetians in a war against the Turks. He published the bull "Inter multiplices" against Gallicism.

Alexander, the name of three Scottish kings. ALEXANDER I, a son of Malcolm Canmore and Margaret of England. He was a great benefactor of the church and a firm vindicator of

Alexander II

the national independence. ALEXANDER II (1198-1248) succeeded his father, William the Lion, in 1214. Alexander died at Kerrera, an island opposite Oban, when on an expedition in which he hoped to wrest the Hebrides from Norway. He was succeeded by his son, ALEXANDER III, a boy of eight, who, in 1251, married Margaret, eldest daughter of Henry III, of England. He brought the Hebrides under his sway in a few years after the defeat of the Norse King Haco at Largs, in 1263. Alexander was strenuous in asserting the independence both of the Scottish kingdom and the Scottish church against England. He died in 1285. Under him Scotland enjoyed greater prosperity than for generations afterward.

Alexander I (1777-1825), emperor of Russia, son of Paul I and Maria, daughter of Prince Eugene of Würtemberg. On the assassination of his father, in 1801, Alexander ascended the throne, and concluded peace with Great Britain, against which his predecessor had declared war. In 1803 he offered his services as mediator between England and France, and two years later a convention was entered into between Russia, England, Austria, and Sweden for the purpose of resisting the encroachments of France on the territories of independent states. He was present at the battle of Austerlitz (1805), when the combined armies of Russia and Austria were defeated by Napoleon. In the succeeding campaign the Russians were again beaten at Eylau and Friedland (1807), the result of which was the treaty at Tilsit. The Russian emperor identified himself with the Napoleonic schemes, and obtained possession of Finland and territory on the Danube. The French alliance was too oppressive, and his having separated himself from Napoleon led to the French invasion of 1812. In 1813 he published a manifesto which served as the basis of the coalition of the other European powers against France, which was followed by the capture of Paris (in 1814), the abdication of Napoleon and the restoration of the Bourbons, and the utter overthrow of Napoleon the following year. After Waterloo, Alexander, accompanied by the emperor of Austria and the king of Prussia, made his second entrance into Paris, where they concluded the treaty known as the Holy Alliance. The remaining part of his reign was chiefly taken up in measures of internal reform, including the gradual abolition of serfdom, and the promotion of education, agriculture, commerce, and manufactures, as well as literature and the fine arts.

Alexander II (1818-1881), emperor of Russia, succeeded his father Nicholas in 1855, before the end of the Crimean war. After peace was concluded the new emperor set about effecting the emancipation of the serfs in 1861, a measure which gave freedom, on certain conditions, to 22,000,000 human beings. Under him, too, representative assemblies were introduced, and he did much to improve education, and to reorganize the judicial system. During his reign the Russian dominions in Central Asia were extended, a piece of territory south of the Caucasus, formerly belong-

Alexander

ing to Turkey, was acquired, and a part of Bessarabia, belonging since the Crimean war to Turkey in Europe, but previously to Russia, was restored to the latter power. The latter additions resulted from the Russo-Turkish war of 1877-78. He was killed by an explosive missile flung at him by a Nihilist in a street in St. Petersburg, March 13, 1881. He was succeeded by his second son, Alexander III (1845-1894), his eldest son having died in youth. His only daughter is the wife of the Duke of Edinburgh.

Alexander, WILLIAM (1726-1783), called "Lord Stirling," soldier, born in New York City. In 1757 he prosecuted his claim to the earldom of Stirling before the British House of Lords, but without success. He became surveyor-general and member of the provincial council. At the beginning of the Revolution he joined the colonial army, 1775, as colonel of the battalion of East Jersey, captured an armed British transport, for which exploit Congress appointed him brigadier-general. At the battle of Long Island, Aug. 26, 1776, he was taken prisoner. Within the same year he was exchanged, and in February, 1777, was promoted a major-general. When Gen. Charles Lee marched to Philadelphia, in December, 1776, Alexander remained in command at New York. He also took a prominent part in numerous later engagements. Alexander was one of the founders of King's College (now Columbia), and became its first president.

Alexander Nevskoi (1219-1263), a Russian hero and saint, son of the Grand-duke Jaroslav. He fought against assaults of the Mongols, the Danes, Swedes, and knights of the Teutonic order. He gained a splendid victory, on the Neva, over the Swedes. His countrymen commemorated him in popular songs, and raised him to the dignity of a saint. Peter the Great built a splendid monastery at St. Petersburg in his honor, and in memory of him established the order of Alexander Nevskoi.

Alexander Seve'rus (A. D. 205-235), a Roman emperor. He was raised to the imperial dignity in 222 A. D. by the prætorian guards, after they had put his cousin, the emperor Heliogabalus, to death. He governed ably both in peace and war; and also occupied himself in poetry, philosophy, and literature. In 232 he defeated the Persians under Artaxerxes, who wished to drive the Romans from Asia. When on an expedition into Gaul to repress an incursion of the Germans, he was murdered with his mother in an insurrection of his troops, headed by the brutal Maximin, who succeeded him as emperor.

Alexandra, Queen of England. Alexandra is the daughter of Christian IX, King of Denmark. She was born December 14, 1844, and married Albert Edward, Prince of Wales and heir to the British throne, March 10, 1863. Her first public act was the opening of the Cambridge School of Art, in 1865, and she was present at the opening of Parliament in 1866. After the death of the Prince Consort, in 1861, Queen Victoria practically withdrew from

Alexandria

society, and this made the Princess of Wales the leading lady in social matters, a position which she has sustained to the general satisfaction of the English people. At the coronation of Edward VII, Aug. 9, 1902, Alexandra was crowned queen. She is noted for her domestic virtues and universal kindness.

Alexan'dria, an ancient city and seaport in Egypt, at the northwest angle of the Nile delta, on a ridge of land between the sea and Lake Mareotis. Ancient Alexandria was founded by, and named in honor of, Alexander the Great, in B. C. 332, and was long a great and splendid city, the center of commerce between the East and West, as well as of Greek learning and civilization, with a population at one time of perhaps 1,000,000. It was especially celebrated for its great library, and also for its famous lighthouse, one of the wonders of the world, standing upon the little island of Pharos, which was connected with the city by a mole. Under Roman rule it was the second city of the empire, and when Constantinople became the capital of the East it still remained the chief center of trade; but it received a blow from which it never recovered when captured by Amru, general of Caliph Omar in 641, after a siege of fourteen months. Its ruin was finally completed by the discovery of the passage to India by the Cape of Good Hope, which opened up a new route for the Asiatic trade. See *Alexandrian Library*, *Alexandrian School*. Modern Alexandria stands partly on what was formerly the island of Pharos, partly on the peninsula which now connects it with the mainland and has been formed by the accumulation of soil, and partly on the mainland. The streets in the Turkish quarter are narrow, dirty, and irregular; in the foreign quarter they are regular and wide, and it is here the finest houses are situated, and where are the principal shops and hotels, banks, offices of companies, etc.; this part of the city being also supplied with gas, and with water brought by the Mahmudieh Canal from the western branch of the Nile. Alexandria is connected by railway with Cairo, Rosetta, and Suez. A little to the south of the city are the catacombs which now serve as a quarry. Another relic of antiquity is Pompey's Pillar, 98 ft. 9 in. high. Alexandria has two ports, on the east and west respectively of the isthmus of the Pharos peninsula, the latter having a breakwater over 3,000 yards in length, with fine quays and suitable railway and other accommodation. The trade of Alexandria is large and varied, the exports being cotton, beans, peas, rice, wheat, etc.; the imports chiefly manufactured goods. At the beginning of the century Alexandria was an insignificant place of 5,000 or 6,000 inhabitants. The origin of its more recent career of prosperity it owes to Mohammed Ali. In 1882 the insurrection of Arabi Pasha and the massacre of Europeans led to the intervention of the British, and the bombardment of the forts by the British fleet, in July. When the British entered the city they found the finest parts of it sacked and in

Alexandria

flames, but the damage is being repaired. Pop. 227,064.

Alexandria, a town and port of Virginia, on the right bank of the Potomac, 7 miles south of Washington, with straight and spacious streets; carries on a considerable trade, chiefly in flour. Pop. 15,230.

Alexandrian Library, the largest and most famous of all the ancient collections of books, founded by Ptolemy Soter, king of Egypt, and greatly enlarged by succeeding Ptolemies. At its most flourishing period it is said to have numbered 700,000 volumes, accommodated in two different buildings, one of them being the Serapeion, or temple of Jupiter Serapis. The other collection was burned during Julius Caesar's siege of the city, but the Serapeion library existed to the time of the emperor Theodosius the Great, when, at the general destruction of the heathen temples, the splendid temple of Jupiter Serapis was gutted (A. D. 391) by a fanatical crowd of Christians, and its literary treasures destroyed or scattered. A library was again accumulated, but was burned by the Arabs when they captured the city under the Caliph Omar in 641. Amru, the captain of the caliph's army, would have been willing to spare the library, but Omar is said to have disposed of the matter in the famous words: "If these writings of the Greeks agree with the Koran they are useless, and need not be preserved; if they disagree they are pernicious, and ought to be destroyed."

Alexandrian School (or Age), the school or period of Greek literature and learning that existed at Alexandria in Egypt during the three hundred years that the rule of the Ptolemies lasted (323–30 B. C.), and continued under the Roman supremacy. Ptolemy Soter founded the famous library of Alexandria and his son, Philadelphus, established a kind of academy of sciences and arts. Many scholars and men of genius were thus attracted to Alexandria, and a period of literary activity set in, which made Alexandria for long the focus and center of Greek culture and intellectual effort. Among the grammarians and critics, were Zenodotus, Eratosthenes, Aristophanes, Aristarchus, and Zoilus, proverbial as a captious critic. Their merit is to have collected, edited, and preserved the existing monuments of Greek literature. To the poets belong Apollonius, Lycophron, Aratus, Nicander, Euphorion, Callimachus, Theocritus, Philetas, etc. Among those who pursued mathematics, physics, and astronomy, was Euclid, the father of scientific geometry; Archimedes, great in physics and mechanics; Apollonius of Perga, whose work on conic sections still exists; Nicomachus, the first scientific arithmetician; and (under the Romans) the astronomer and geographer Ptolemy. Alexandria also was distinguished in philosophical speculation, and it was here that the New Platonic school was established at the close of the second century after Christ by Ammonius of Alexandria (about 193 A. D.), whose disciples were Plotinus and Origen. Being for the most part Orientals, formed by

Alfieri

the study of Greek learning, the writings of the New Platonists are strikingly characterized—for example, those of Ammonius Saccas, Plotinus, Iamblicus, Porphyrius—by a mixture of Asiatic and European elements. The principal Gnostic systems also had their origin in Alexandria.

Alexandrian Version, or Codex Alexandrinus, a manuscript in the British Museum, of great importance in Biblical criticism, written on parchment with uncial letters, and belonging probably to the latter half of the sixth century. It contains the whole Greek Bible (the Old Testament being according to the Septuagint), together with the letters of Bishop Clement of Rome, but it wants parts of Matthew, John, and Second Corinthians. The Patriarch of Constantinople, who in 1628 sent this manuscript as a present to Charles I, said he had received it from Egypt (whence its name).

Alex'is Michai'lovitch (son of Michael) (1629–1676), second Russian czar of the line of Romanoff (the present dynasty). He did much for the internal administration and for the enlargement of the empire; reconquered Little Russia from Poland, and carried his authority to the extreme east of Siberia. He was father of Peter the Great.

Alex'ius Comnenus (1048–1118), Byzantine emperor. See *Byzantine Empire*.

Alfal'fa, a name given to a perennial forage plant, and one of the most valuable of the leguminous plants grown for the supply of green food to cattle. It is sometimes known as Lucerne. It is a native of the south of Europe, and has been cultivated there from an unknown antiquity. It is largely cultivated in some parts of North and South America. It is especially adapted to the Southern states. It endures great droughts, its roots penetrating very deep into the ground. It is the best of all forage crops for a drought. It delights in a rich and calcareous soil, and never succeeds on damp soils or tenacious clays. It is a perennial, and if kept free from weeds affords good crops for six, seven, or more years. It is sown in rows, at 10 or 14 inches apart, and may be mown several times in a year, growing very quickly after being mown. The quantity of produce is very great—sometimes from twenty to thirty tons per annum—and few other forage plants are ready for use so early in spring. Alfalfa has a rather erect stem, leaves with three obovate-oblong toothed leaflets; purplish-blue or sometimes yellow flowers in many-flowered racemes, and pods twisted two or three times round.

Alfara'bi, an eminent Arabian scholar of the tenth century; died at Damascus in 950; wrote on the Aristotelian philosophy, and compiled a kind of encyclopedia.

Alfieri (âl-fè-à-rè), VITTORIO, COUNT (1749–1803), Italian poet. After extensive European travels he began to write, and his first play, *Cleopatra* (1775), being received with general applause, he determined to devote all his efforts to attaining a position among writers of dramatic

Alford

poetry. He died at Florence and was buried in the church of Santa Croce, between Macchiavelli and Michael Angelo, where a beautiful monument by Canova covers his remains. He wrote twenty-one tragedies and six comedies. He is considered the first tragic writer of Italy, and has served as a model for his successors. Alfieri composed also an epic, lyrics, satires, and poetical translations from the ancient classics. He left an interesting autobiography.

Alford, HENRY, D. D. (1810-1871), Dean of Canterbury, an English poet, scholar, and miscellaneous writer. He wrote an edition of the Greek Testament with commentary, which occupied him for twenty years. In 1857 he was appointed Dean of Canterbury. Among other things he wrote *Chapters on the Poets of Ancient Greece, Sermons, Psalms and Hymns, Homilies on the Acts of the Apostles, Letters from Abroad, Poetical Works, Plea for the Queen's English*.

Alfred the Great (849-901), king of the West Saxons. The youngest son of Ethelwulf, who reigned 836-858, he came to the throne in 871, the intervening thirteen years having been occupied by the reigns of his three older brothers. In his youth Alfred was an eager student, and so remained through life. His entire reign of 30 years was occupied in repelling the attacks of invading Danes and Northmen, and in restoring his country from the effects of their ravages. On coming to the throne Alfred made a truce with the Danes, who turned their attention to the other provinces of Britain. It is to be noticed that Alfred was not king of all England, his dominions having extended hardly as far north as the mouth of the Severn. He fitted out a number of ships and with these resumed hostilities in 876. The following spring he is said to have met a force of 120 Danish ships and driven them on shore, where all on board perished in the wreck. The next winter the Danes invaded in large numbers, and Alfred with his followers fled to the hills and woods for safety. It is to this period that the familiar legend of the burning cakes belongs. He was joined by a band of trusty followers, and made repeated sallies against the enemy's possessions. In May, 878, he prepared to attack the Danish army under Guthrum at Eddington. It is said that two or three days before the battle he entered the Danish camp disguised as a gleeman, and gained all the information desired respecting their strength and position. In the battle that followed, the Danes were utterly defeated. Guthrum and his followers accepted Christianity and were assigned territory north of Wessex. He afterward ceded to them the eastern portion of Mercia, which became known as the *Danelagh*. Alfred was now the ruler of nearly all England, though never recognized by title as such. During the period of peace which followed Alfred rebuilt the cities and fortresses and improved his fleet. Ships were stationed at intervals along the coast to guard against invasion. It is to this period that Alfred's most

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important government reforms and literary labors belong. He established a regular militia which should be able to protect the several parts of the kingdom without leaving any district defenseless. The last invasion during Alfred's reign was in 894 under the famous Hastings. After three years of hard fighting in nearly all parts of the kingdom, the invaders were driven out. Alfred's last years were passed in peace. He was succeeded by his son, Edward the Elder.

Of all the monarchs to whom the title of "Great" has been given, none deserves it, in point of character, as does Alfred. The selfish ambition and cruelty which have stained the characters of other great rulers are not recorded in his life. In the making and administration of laws, in his careful oversight of the courts of justice, in his promotion of the arts of peace, he had the welfare of his subjects ever in view. He was blessed with signal good judgment in choosing his advisers. Of his military genius, the record of obstacles patiently combated and victoriously overcome is sufficient witness. He was in belief and in practise a devout Christian; for many years he suffered uncomplainingly the ravages of a dread, mysterious disease. Alfred is conspicuous for the patronage he gave to letters, and his own learning and industrious scholarship are most remarkable. To bring knowledge within reach of his subjects he translated Bede's *Ecclesiastical History of England*, Gregory's *Pastoral Care*, Boethius's *Consolations of Philosophy*, from Latin into Anglo-Saxon, adding much of his own composition. It was during his reign that the valuable *Anglo-Saxon Chronicle* assumed a systematic form. He represents all that is greatest and best in the modern Christian civilization of the West, and was the herald of centuries far removed from him in point of time.

Al'gae (al'jē), an order of plants, found for the most part in the sea and fresh water, and comprising sea-weeds, etc. The higher forms have stems bearing leaf-like expansions, and they are often attached to the rocks by roots, which, however, do not derive nutriment from the rocks. A stem, however, is most frequently absent. The plants are nourished through their whole surface by the medium in which they live. They vary in size from the microscopic diatoms to forms whose stems resemble those of forest trees, and whose fronds rival the leaves of the palm. They are entirely composed of cellular tissue, and many are edible and nutritious, as carrageen or Irish-moss, dulse, etc. Kelp, iodine, and bromine are products of various species. The Algae are also valuable as manure.

Aigar'di, ALESSANDRO (1602-1654), one of the chief Italian sculptors of the seventeenth century. He lived and worked chiefly at Rome; executed the tomb of Leo XI in St. Peter's, and a marble relief with life-size figures over the altar of St. Leo there.

Algarve (āl-gār'vā), a maritime province of Portugal occupying the southern portion of the kingdom; mountainous but with some

Algebra

fertile tracts. Area 2,099 sq. mi.; pop. 200,000.

Al'gebra, a kind of generalized arithmetic, in which numbers or quantities and operations, often also the results of operations, are represented by symbols. Thus the expression $xy + cz + dy^2$ denotes that a number represented by x is to be multiplied by a number represented by y , a number c multiplied by a number z , a number d by a number y multiplied by itself (or squared), and the sum taken of these three products. So the equation (as it is called) $x^2 - 7x + 12 = 0$ expresses the fact that if a certain number x is multiplied by itself, and this result made less by seven times the number and greater by twelve, the result is 0. In this case x must either be 3 or 4 to produce the given result; but such an equation (or formula) as $(a + b)(a - b) = a^2 - b^2$ is always true whatever values may be assigned to a and b . Algebra is an invaluable instrument in intricate calculations of all kinds, and enables operations to be performed and results obtained that by arithmetic would be impossible, and its scope is still being extended.

The beginnings of algebraic method are to be found in Diophantus, a Greek of the fourth century of our era, but it was the Arabians that introduced algebra to Europe, and from them it received its name. The first Arabian treatise on algebra was published in the reign of the great Caliph Al Mamun (813-833) by Mohammed Ben Musa. In 1202 Leonardo Fibonacci of Pisa, who had traveled and studied in the East, published a work treating of algebra as then understood in the Arabian school. From this time to the discovery of printing considerable attention was given to algebra, and the work of Ben Musa and another Arabian treatise, called the *Rule of Algebra*, were translated into Italian. The first printed work treating on algebra (also on arithmetic, etc.) appeared at Venice in 1494, the author being a monk called Luca Pacioli da Bergamo. Rapid progress now began to be made, and among the names of those to whom advances are to be attributed are Tartaglia and Cardan. About the middle of the sixteenth century the German Stifel introduced the signs $+$, $-$, $\sqrt{}$, and Reorde wrote the sign $=$. Recorde wrote the first English work on algebra. François Vieta, a French mathematician (1540-1603), first adopted the method which has led to so great an extension of modern algebra, by being the first who used general symbols for known quantities as well as for unknown. It was he also who first made the application of algebra to geometry. Albert Girard extended the theory of equations by the supposition of imaginary quantities. The Englishman Harriot, early in the seventeenth century, discovered negative roots, and established the equality between the number of roots and the units in the degree of the equation. He also invented the signs $<$, $>$, and Oughtthred that of \times . Descartes, though not the first to apply algebra to geometry, has, by the extent and importance of his applications, commonly acquired the

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credit of being so. The same discoveries have also been attributed to him as to Harriot, and their respective claims have caused much controversy. He obtained by means of algebra the definition and description of curves. Since his time algebra has been applied so widely in geometry and higher mathematics that we need only mention the names of Fermat, Wallis, Newton, Leibnitz, De Moivre, Mac Laurin, Taylor, Euler, D'Alembert, Lagrange, Laplace, Fourier, Poisson, Gauss, Horner, De Morgan, Sylvester, Cayley, Boole, Jevons, and others who applied the algebraic method not only to formal logic but to political economy.

Algeciras (âl-he-thê' rās), a seaport of Spain, on the west side of the Bay of Gibraltar, a well-built town carrying on a brisk coasting trade. It was the first conquest of the Arabs in Spain (711), and was held by them till 1344, when it was taken by Alphonso XI of Castile after a siege of twenty months. Near Algeciras, in July, 1801, the English admiral Saumarez defeated the combined French and Spanish fleets, after having failed in an attack a few days before. Pop. 14,230.

Alger, HORATIO, JR., an American author of books for young people, born in Massachusetts, 1834. His works are numerous and very popular. Died July 18, 1899.

Alger, RUSSELL A., an American soldier and statesman, b. in Medina co., O., 1836, in a log cabin. His parents died when he was twelve years old, leaving four children to fight the battles of life. When fourteen years of age he began to work as a common farm laborer at \$3 a month. He received a fair English education, but it was in the university of adversity. Shortly after his marriage the war broke out, and in August, 1861, he enlisted in the Second Michigan cavalry, and was commissioned as captain. He was several times wounded, and was obliged to resign from the army on Sept. 20, 1864. Returning from the field he settled in Detroit, and became interested in the lumber trade. In 1884 he was elected governor of the state of Michigan on the Republican ticket and in February, 1897, was selected by President McKinley as his secretary of war, which position he resigned Aug. 1 1899.

Alge'ria, a French colony in North Africa, area 122,878 sq. mi. The country is divided into three departments—Algiers, Oran, and Constantine. The country is traversed by the Atlas Mountains, two chains of which—the Great Atlas bordering on the Sahara, and the Little, or Maritime Atlas, between it and the sea—run parallel to the coast, the former attaining a height of 7,000 feet. The climate varies considerably according to elevation and local peculiarities. There are three seasons: winter from November to February, spring from March to June, and summer from July to October. The summer is very hot and dry. In many parts of the coast the temperature is moderate and the climate so healthy that Algeria is now a winter resort for invalids.

The chief products of cultivation are wheat, barley, and oats, tobacco, cotton, wine, silk,



ENGLISH ESSAYISTS

Joseph Addison
Thomas DeQuincey

Charles Lamb
John Ruskin

LIBRARY
OF THE
UNIVERSITY OF ILLINOIS

Algeria

and dates. Early vegetables, especially potatoes and peas, are exported to France and England. A fiber called *alfa*, a variety of esparto, which grows wild on the high plateaux, is exported in large quantities. Cork is also exported. There are valuable forests, in which grow various sorts of pines and oaks, ash, cedar, myrtle, pistachio-nut, mastic, carob, etc. The Australian gum-tree has been successfully introduced. Agriculture often suffers much from the ravages of locusts. Among wild animals are the lion, panther, hyena, and jackal; the domestic quadrupeds include the horse, the mule, cattle, sheep, and pigs (introduced by the French). Algeria possesses valuable minerals, including iron, copper, lead, sulphur, zinc, antimony, marble (white and red), and lithographic stone.

The exports (besides those mentioned above) are olive-oil, rawhides, wood, wool, tobacco, oranges, etc.; the imports: manufactured goods, wines, spirits, coffee, etc. The manufacturing industries are unimportant, and include morocco leather, carpets, muslins, and silks. French money, weights, and measures are generally used. The chief towns are Algiers, Oran, Constantine, Bona, and Tlemcen. There are about 1,300 miles of railways opened; there is also a considerable network of telegraph lines.

The two principal native races inhabiting Algeria are Arabs and Berbers. The former are mostly nomads, dwelling in tents and wandering from place to place. The Berbers, here called Kabyles, are the original inhabitants of the territory and still form a considerable part of the population. They speak the Berber language, but use Arabic characters in writing. The Jews form a small but influential part of the population. Various other races also exist. Except the Jews all the native races are Mohammedans. There are over 260,000 colonists of French origin in Algeria, and over 200,000 colonists natives of other European countries (chiefly Spaniards and Italians). Algeria is governed by a governor-general, who is assisted by a council appointed by the French Government. The settled portion of the country, in the three departments of Algiers, Constantine, and Oran, is treated much as if it were a part of France, and each department sends two deputies and one senator to the French chambers. The rest of the territory is under military rule. The colony costs France a considerable sum every year. Population of civil ter. 3,324,475; of mil. ter. 492,990; total, 3,817,465.

The country now called Algeria was known to the Romans as Numidia. It flourished greatly under their rule. It was conquered by the Vandals in 430-431 A. D., and recovered by Belisarius for the Byzantine Empire in 533-534. About the middle of the seventh century it was overrun by the Saracens. The town of Algiers was founded about 935 by Yussef Ibn Zeiri, and the country was subsequently ruled by his successors and the dynasties of the Almoravides and Almohades. After the overthrow of the latter, about 1269, it broke up into a number of small independent terri-

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tories. The Moors and Jews who were driven out of Spain by Ferdinand and Isabella at the end of the fifteenth century settled in Algeria. Various expeditions were made by Spain against Algeria, and by 1510 the greater part of the country was made tributary. A few years later the Algerians invited to their assistance the Turkish pirate Horush Barbarossa, who made himself Sultan of Algiers in 1516, but was not long in being taken by the Spaniards and beheaded. His brother and successor put Algiers under the protection of Turkey (about 1520), and organized the system of piracy which was long the terror of European commerce, and was never wholly suppressed till the French occupation. Henceforth the country belonged to the Turkish Empire, though from 1710 the connection was little more than nominal. The depredations of the Algerian pirates were a continual source of irritation to the powers, who sent a long series of expeditions against them. In 1815 a U. S. fleet defeated an Algerian one and forced the dey to agree to a peace in which he recognized the American flag as inviolable. In 1816 Lord Exmouth with an English fleet bombarded Algiers, and exacted a treaty by which all the Christian slaves were at once released, and the dey undertook for the future to treat all his prisoners of war as the European law of nations demanded. At last the French, 1830, sent a force of over 40,000 men against the country. Algiers was speedily occupied, the dey retired, and the country was without a government, but resistance was organized by Abd-el-Kader, an Arab chief whom the emergency had raised up. He began his warlike career of fifteen years by an attack on Oran in 1832, and after an obstinate struggle the French, in February, 1834, consented to a peace, acknowledging him as ruling over all the Arab tribes west of the Shelif by the title of Emir of Maskara. War was soon again renewed with varying fortune, and in 1837, in order to have their hands free in attacking Constantine, the French made peace with Abd-el-Kader, leaving to him the whole of western Algeria except some coast towns. Abd-el-Kader prepared for another conflict, and in 1838, broke into French territory with a strong force, and for a time the supremacy of the French was endangered. Gen. Bugeaud was appointed governor-general in February, 1841. In the autumn of 1841 Saïda, the last fortress of Abd-el-Kader, fell into his hands. Abd-el-Kader found himself compelled to seek refuge in the adjoining empire. From Morocco he twice made a descent upon Algeria, on the second occasion defeating the French in two battles; and in 1844 he even succeeded in raising an army in Morocco to withstand the French. Bugeaud crossed the frontier, and inflicted a severe defeat on this army, while a French fleet bombarded the towns on the coast. The emperor of Morocco was at length compelled to agree to a treaty, in which he not only promised to refuse Abd-el-Kader his assistance, but even engaged to lend his assistance against him. Reduced to extremi-

Algiers

ties Abd-el-Kader surrendered, 1847, and was taken to France a prisoner, but was released on his promise not to return to Algeria. Repeated risings have taken place, especially during the Franco-German war of 1871.

Algiers (al'jêrz), a city and seaport on the Mediterranean, capital of Algeria, on the Bay of Algiers, partly on the slope of a hill facing the sea. The old town, which is the higher, is oriental in appearance, with narrow, crooked streets, and houses that are strong, prison-like edifices. The modern French town, which occupies the lower slope and spreads along the shore, is handsomely built, with broad streets, and elegant squares. There is a large shipping trade carried on. The climate of Algiers, though extremely variable, makes it a very desirable winter residence for invalids and others from colder regions. The winter months resemble a bright, sunny autumn, while the heat of summer is not so intense as that of Egypt. Pop. 96,784.

Algo'a Bay, a bay on the south coast of Cape Colony, 425 mi. from the Cape of Good Hope, the only place of shelter on this coast for vessels during the prevailing northwest gales. The usual anchorage is off Port Elizabeth, on its west coast, now a place of large and increasing trade.

Algo'ma, a district of Canada, on the north side of Lake Superior, forming the northwest portion of Ontario, rich in silver, copper, iron, etc.

Algon'kins, one of the two great families of North American Indians, formerly spread over a great extent of territory, and still forming a large proportion of the Indians of Canada. They consist of four groups; namely, 1, the eastern group, comprising the Massachusetts, Narragansetts, Mohicans, Delawares, and other tribes; 2, the northeastern group, consisting of the Abenakis, etc.; 3, the western group, made up of the Shawnees, Miamis, Illinois, etc.; 4, the northwestern group, including the Chippewas, or Ojibbewas, the largest of all the tribes.

Alhama (â-lâ'mâ) (that is, "the bath"), a town of southern Spain, province of Granada, 25 mi. s.w. of Granada, celebrated for its warm medicinal (sulphur) baths and drinking waters. It formed a Moorish fortress, the recovery of which in 1482 by the Spaniards led to the entire conquest of Granada. It was thrown into ruins by an earthquake in December, 1884. Pop. 8,000.

Alham'bra ("the red castle"), a famous group of buildings in Spain, forming the citadel of Granada when that city was one of the principal seats of the empire of the Moors in Spain, situated on a height, surrounded by a wall flanked by many towers, and having a circuit of 2½ mi. Within the circuit of the walls are two churches, a number of mean houses and some straggling gardens, besides the palace of Charles V and the celebrated Moorish palace, which is often distinctively spoken of as the **Alhambra**. This building was the royal palace of the kings of Granada. The greater part of

Alicata

the present building belongs to the first half of the fourteenth century. It consists mainly of buildings surrounding two oblong courts, the one called the Court of the Fish-pond (or of the Myrtles), 138 by 74 feet, lying north and south; the other called the Court of the Lions, from a fountain ornamented with twelve lions in marble, 115 feet by 66 feet, lying east and west, described as being, with the apartments that surround it, "the gem of Arabian art in Spain, its most beautiful and most perfect example." Its design is elaborate, exhibiting a profusion of exquisite detail, gorgeous in coloring, but the smallness of its size deprives it of the element of majesty. The peristyle or portico on each side is supported by 128 pillars of white marble, 11 feet high, sometimes placed singly and sometimes in groups. Two pavilions project into the court at each end, the domed roof of one having been lately restored. Some of the finest chambers of the Alhambra open into this court, and near the entrance a museum of Moorish remains has been formed. The prevalence of stucco or plaster ornamentation is one of the features of the Alhambra, which becomes especially remarkable in the beautiful honey-comb-stalactical pendentives which the ceilings exhibit. Arabesques and geometrical designs with interwoven inscriptions are present in the richest profusion. The beauties of Alhambra have been glowingly described by Washington Irving.

Ali (â'lê) (A. D. 602-661), cousin and son-in-law of Mohammed, the first of his converts, and the bravest and most faithful of his adherents.

Ali, Pasha of Yanina (1741-1822), generally called *Ali Pasha*, a bold and able, but ferocious and unscrupulous Albanian. He made himself master of a large part of Albania, including Yanina, which the Porte sanctioned his holding, with the title of pasha. In 1820 Sultan Mahmoud pronounced his deposition. He surrendered in 1822, and his treasures were seized by the Porte.

Alicante (â-lê-kân'tâ), a fortified town and Mediterranean seaport in Spain, capital of the province of the same name, 80 mi. s. by w. of Valencia. The principal manufactures are cotton, linen, and cigars; one cigar manufactory employing above 3,000 women. The chief export is wine, which largely goes to England. In 718 it was taken by the Moors, from whom it was wrested about 1240. It was besieged and bombarded by the French in 1709 and in 1812, and by the people of Cartagena during the commotions of 1873. Pop. 39,638.—The *province* is very fruitful and well cultivated, producing wine, silk, fruits, etc. Area 2,098 sq. mi. Pop. 433,050.

Alicata (or Licata) (â-lê-kâ'tâ, lê-kâ'tâ), the most important commercial town on the s. coast of Sicily, 24 mi. e.s.e. of Girgenti, with a considerable trade in sulphur, grain, wine, oil, nuts, almonds, and soda. It occupies the site of the town which the Tyrant Phintias of Acragas erected and named after himself, when Gela was destroyed in 280. Pop. 15,966.

Alien

A'lien, in relation to any country, a person born out of the jurisdiction of the country, and not having acquired the full rights of a citizen of it. The position of aliens depends upon the laws of the respective countries, but generally speaking, aliens owe a local allegiance, and are bound equally with natives to obey all general rules for the preservation of order which do not relate especially to citizens. In the U. S. the position of aliens as regards acquisition and holding of real property differs somewhat in the different states, though in recent times the disabilities of aliens have been removed in most of them. Personal property they can take, hold, and dispose of, like native citizens. Individual states have no jurisdiction on the subject of naturalization, though they may pass laws admitting aliens to any privilege short of citizenship. A naturalized citizen is not eligible to election as president or vice-president of the U. S., and cannot serve as senator until after nine years' citizenship, nor as a member of the House of Representatives until after seven years' citizenship. Five years' residence in the U. S. and one year's permanent residence in the particular state where the application is made are necessary for the attainment of citizenship. See *Naturalization*.

Alien and Sedition Laws.—French interference in the domestic politics of the U. S. caused the passage by Congress, June 25, 1798, of the Alien law, giving the president power to order aliens whom he should adjudge dangerous, out of the country, and providing for the fine and imprisonment of those who refused to go. The Sedition law, passed July 14, 1798, to remain in force till March 3, 1801, imposed fine and imprisonment on conspirators to resist government measures, and on libelers and scandalizers of the government, Congress, or the president.

Aligarh (*a-le-gar'*), a fort and town in India, in the Northwest Provinces, on the East Indian railway, 84 mi. s.e. of Delhi. The town properly called Koel or Coel, is distant about 2 mi. from the fort. Pop. 61,730. The district has an area of 1,954 sq. mi., and a population of 1,021,187.

Al'iment, food, a term which includes everything, solid or liquid, serving as nutriment for the bodily system. Aliments are of the most diverse character, but all of them must contain nutritious matter of some kind, which, being extracted by the act of digestion, enters the blood, and effects by assimilation the repair of the body. Alimentary matter, therefore, must be similar to animal substance, or transmutable into such. All alimentary substances must, therefore, be composed in a greater or less degree of soluble parts, which easily lose their peculiar qualities in the process of digestion, and correspond to the elements of the body. The food of animals consists for the most part of substances containing little oxygen and exhibiting a high degree of chemical combination, in which respects they differ from most sub-

Aliment

stances that serve as sustenance for plants, which are generally highly oxidized and exhibit little chemical combinations. According to the nature of their constituents most of the aliments of animals are divided into nitrogenous (consisting of carbon, hydrogen, and oxygen along with nitrogen, and also of sulphur and phosphorus) and non-nitrogenous (consisting of carbon, hydrogen, and oxygen without nitrogen). Water and salts are usually considered as forming a third group, and in the widest sense of the word aliment, oxygen alone, which enters the blood in the lungs, forms a fourth. The articles used as food by man do not consist entirely of nutritious substances, but with few exceptions are compounds of various nutritious with indigestible and accordingly innutritious substances. The only nitrogenous aliments are albuminous substances, and these are contained largely in animal food (flesh, eggs, milk, cheese). The principal non-nitrogenous substance obtained as food from animals is fat. Sugar is so obtained in smaller quantities (in milk). While some vegetable substances also contain much albumen, very many of them are rich in starch. Among vegetable substances the richest in albumen are the legumes (peas, beans, and lentils), and following them come the cereals (wheat, oats, etc.). Sugar, water, and salts may pass without any change into the circulatory system; but albuminous substances cannot do so without being first rendered soluble and capable of absorption (in the stomach and intestines); starch must be converted into sugar, and fat emulsified (chiefly by the action of the pancreatic juice). One of the objects of cooking is to make our food more susceptible of the operation of the digestive fluids.

The relative importance of the various nutritious substances that are taken into the system and enter the blood depends upon their chemical constitution. The albuminous substances are the most indispensable, inasmuch as they form the material by which the constant waste of the body is repaired, whence they are called by Liebig the substance-formers. But a part of the operation of albuminous nutriments may be performed equally well, and at less cost, by non-nitrogenous substances, that part being the maintenance of the temperature of the body. As is well known, the temperature of warm-blooded animals is considerably higher than the ordinary temperature of the surrounding air, in man about 98° F., and the uniformity of this temperature is maintained by the heat which is set free by the chemical processes (of oxidation) which go on within the body. Now these processes take place as well with non-nitrogenous as with nitrogenous substances. The former are even preferable to the latter for the keeping up of these processes; by oxidation they yield larger quantities of heat with less labor to the body, and they are hence called the heat-givers. The best heat-giver is

Alimentary Canal

fat. Albuminous matters are not only the tissue-formers of the body; they also supply the vehicle for the oxygen, inasmuch as it is of such matters that the blood corpuscles are formed. The more red-blood corpuscles an animal possesses, the more oxygen can it take into its system, and the more easily and rapidly can it carry on the process of oxidation and develop heat. Now only a part of the heat so developed passes away into the environment of the animal; another part is transformed within the body (in the muscles) into mechanical work. Hence it follows that the non-nitrogenous articles of food produce not merely heat but also work, but only with the assistance of albuminous matters, which, on the one hand, compose the working machine, and, on the other hand, convey the oxygen necessary for oxidation.

The wholesome or unwholesome character of any aliment depends, in a great measure, on the state of the digestive organs in any given case, as also on the method in which it is cooked. Very often a simple aliment is made indigestible by artificial cookery. In any given case, the digestive power of the individual is to be considered in order to determine whether a particular aliment is wholesome or not. In general, therefore, we can only say that that aliment is healthy which is easily soluble, and is suited to the power of digestion of the individual. Man is fitted to derive nourishment both from animal and vegetable aliment, but can live exclusively on either. The nations of the North incline generally more to animal aliments; those of the South, and the Orientals, more to vegetable. The inhabitants of the most northern regions live almost entirely upon animal food, and very largely on fat on account of its heat-giving property. See *Dietetics, Digestion, Adulteration, etc.*

Alimentary Canal, a common name given to the œsophagus, stomach, and intestines of animals. See *Anatomy*.

Alimony, in law, the allowance to which a woman is entitled while a matrimonial suit is pending between her and her husband, or after a legal separation from her husband, not occasioned by adultery or elopement on her part.

Al'ison, ARCHIBALD (1792-1867), an English lawyer and writer of history. His chief work, *The History of Europe from 1789 to 1815*, was first issued in ten vols. in 1833-42, the narrative being subsequently brought down to 1852, the beginning of the second French Empire. This work displays industry and research, and is generally accurate, but not very readable. Its popularity, however, has been immense, and it has been translated into French, German, Arabic, Hindustani, etc.

Aliwal', a village of Hindustan in the Punjab, on the left bank of the Sutlej, celebrated from the battle fought in its vicinity, Jan. 28, 1846, between the Sikhs and a British army, resulting in the total defeat of the Sikhs.

Aliz'arine, a substance contained in the madder root, and largely used in dyeing reds

Alkanet

of various shades. Formerly madder root was largely employed as a dye-stuff, its capability of dyeing being chiefly due to the presence in it of alizarine; but the use of the root has been almost superseded by the employment of alizarine itself, prepared artificially from one of the constituents of coal-tar. It forms yellowish-red prismatic crystals, nearly insoluble in cold, but dissolved to a small extent by boiling water, and readily soluble in alcohol and ether. It possesses exceedingly strong tinctorial powers.

Al'kali, a term first used to designate the soluble part of the ashes of plants, especially sea-weed. Now the term is applied to various classes of bodies having the following properties in common: (1) solubility in water; (2) the power of neutralizing acids, and forming salts with them; (3) the property of corroding animal and vegetable substances; (4) the property of altering the tint of many coloring matters—thus, they turn litmus, reddened by an acid, into blue; turmeric, brown; and syrup of violets, an infusion of red cabbages, green. The alkalies are hydrates, or water in which half the hydrogen is replaced by a metal or compound radical. In its restricted and common sense the term is applied to four substances only: hydrate of potassium (potash), hydrate of sodium (soda), hydrate of lithium (lithia), and hydrate of ammonium (an aqueous solution of ammonia). In a more general sense it is applied to the hydrates of the so-called *alkaline earths* (baryta, strontia, and lime), and to a large number of organic substances, both natural and artificial, described under *Alkaloid*. *Volatile alkali* is a name for ammonia.

Al'kaloid, a term applied to a class of nitrogenized compounds having certain alkaline properties, found in living plants, and containing their active principles, usually in combination with organic acids. Their names generally end in *ine*, as *morphine, quinine, aconitine, caffeine*, etc. Most alkaloids occur in plants, but some are formed by decomposition. Their alkaline character depends on the nitrogen they contain. Most natural alkaloids contain carbon, hydrogen, nitrogen, and oxygen, but the greater number of artificial ones want the oxygen. The only property common to all alkaloids is that of combining with acids to form salts, and some exhibit an alkaline reaction with colors. Alkaloids form what is termed the *organic bases* of plants. Although formed originally within the plant, it has been found possible to prepare several of these alkaloids by purely artificial means.

Al'kanet, a dyeing drug, the bark of the root of the *Anchusa*, or *Alkanna tinctoria*, a plant with downy and spear-shaped leaves, and clusters of small purple or reddish flowers. The plant is sometimes cultivated in Britain, but most of the alkanet of commerce is imported from the Levant or from southern France. It imparts a fine deep-red color and is used for coloring oils, plasters, lip-salve, confections, etc.; also in compositions for rub

Alkmaar

bing and giving color to mahogany furniture, and to color spurious port-wine.

Alkmaar (älk'mär), a town of the Netherlands, prov. of North Holland, 20 mi. n. n. w. of Amsterdam. It has manufactures of salt, sail-cloth, vinegar, leather, etc., and an extensive trade in cattle, corn, butter, and cheese. Pop. 13,304.

Al'lah, in Arabic, the name of God, a word of kindred origin with the Hebrew word *Elohim*. *Allah Akbar* (God is great) is a Mohammedan war-cry.

Allahabad ("City of Allah"), an ancient city of India, capital of the Northwest Provinces. Allahabad is one of the chief resorts of Hindu pilgrims, who have their sins washed away by bathing in the waters of the sacred rivers Ganges and Jumna at their junction; and is also the scene of a great fair in December and January. A large general and transit trade is carried on. The town is as old as the third century B. C. In the mutiny of 1857 it was the scene of a serious outbreak and massacre. Pop. in 1901, 175,750.

Allen, Sir Hugh (1810-1882), born in Scotland. In 1824 he came to Canada, and established the Allan line of ocean steamers. He was a director of several banks, and was knighted in 1871.

Allen, Sir William (1782-1850), a distinguished Scottish artist. In 1814 he exhibited his pictures, one of which, *Circassian Captives*, made his reputation. He now turned his attention to historical painting, and produced *Knox Admonishing Mary Queen of Scots*, *Murder of Rizzio*, *Exiles on Their Way to Siberia*, *The Slave Market at Constantinople*, etc.; latterly also battle scenes, as the *Battle of Prestonpans*, *Nelson Boarding the San Nicolas*, and two pictures of the *Battle of Waterloo*, the one from the British, the other from the French position, and delineating the actual scene and the incidents therein taking place at the moment chosen for the representation.

Alleghany (al-le-gā'ni), a river of Pennsylvania and New York, which unites with the Monongahela at Pittsburg to form the Ohio; navigable nearly 200 miles above Pittsburg.

Alleghany Mountains, a name sometimes used as synonymous with Appalachians, but also often restricted to the portion of those mountains that traverses the states of Virginia, Maryland, and Pennsylvania from southwest to northeast, and consists of a series of parallel ridges for the most part wooded to the summit, and with some fertile valleys between. Their mean elevation is about 2,500 feet; but in Virginia they rise to over 4,000.

Allegheny, a city in Allegheny co., Pa., separated from Pittsburg by the Allegheny river, here crossed by nine bridges, two of which are fine suspension bridges. Allegheny is the terminus of the Western Pennsylvania, the Pittsburg & Western, and the Pacific, Rochester & Pittsburg; and is on the Pittsburg, Fort Wayne & Chicago, the Cleveland & Pittsburg, the Pittsburg & Erie and the Pittsburg & New Castle railroads.

Allen

Allegheny and Pittsburg form one industrial and social community. The city's manufacturing interests are large. Important among these are iron and steel rolling mills, car and locomotive works and manufactures of textiles, flour, salt, sanitary plumbing supplies, white lead, leather, stoves, pickles and preserves. The finest public buildings are the city hall and the Carnegie Free Library. In the center of the city is a public park of 100 acres, containing pretty lakelets and fountains and a monument to Humboldt. The fine Library Monument, in memory of the soldiers from Allegheny county, who perished in the Civil War, stands on a lofty crest overlooking the river. Among important educational institutions are the Western Theological Seminary, the United Presbyterian Theological Seminary, the Allegheny Theological Institute and the Western University of Pennsylvania. The Allegheny Observatory is on a high hill near the University. The town was laid out in 1788. Pop. 1900, 129,896.

Allen, Ethan (1737-1789), soldier, born in Litchfield, Conn. About 1763 he settled near Bennington. In 1764, the king decided in favor of the claim of New York to jurisdiction over the Green Mountain territory against the settlers under the New Hampshire grants. Allen was chosen to plead the cause of the New Hampshire settlers at Albany, N. Y. The courts decided adversely. Allen was made colonel of the "Green Mountain Boys," who, with the New Hampshire grantees, expelled the New York settlers. Governor Tryon, of New York, offered \$750 reward for Allen. Allen retaliated by offering a reward for Tryon. In 1775, after the battle of Lexington, the condition of Fort Ticonderoga attracted the attention of the patriots. Allen and Benedict Arnold both were eager to effect its capture. Arnold was commissioned colonel by Massachusetts, but the "Green Mountain Boys," with Allen, reached Lake George before Arnold overtook them, and they would not receive a new commander. On May 10, when only eighty-four of his men had as yet crossed the lake, Allen rushed into the fort and ordered the commander to surrender "in the name of the Great Jehovah and the Continental Congress!" The fort contained a large amount of artillery and arms. Allen went to Philadelphia, where he received the thanks of Congress for his services. He was sent on a secret mission to Canada to learn the views of the Canadians as to rebellion. On his way to Gen. Montgomery's expedition he took part in a rash adventure at Montreal on September 25, and was captured and sent to England. He was returned to this country, where he was confined in prison-ships, but later allowed partial liberty. In 1779 Allen published a *Narrative* of his treatment while a British prisoner. It is a compound of local barbarisms, Scripture, physiology, and Oriental wildness. After Burgoyne's surrender at Saratoga, Congress secured Allen's release. Allen, on obtaining his freedom, was ap-

Allen

pointed major-general of the Vermont militia, and sent as an agent to Congress to secure the admission of Vermont to the Confederation. Congress hesitated, and the British commanders endeavored to persuade Allen to restore the authority of the crown. Vermont sent these letters to the president of Congress, and soon became a part of the Union, although not recognized as a state until 1791. After the Revolution Allen lived in retirement, writing a book on natural religion, 1784, entitled *Reason the Only Oracle of Man*. This is the first work opposed to Christianity published in America.

Allen, WILLIAM, D. D. (1784-1868), American clergyman and author. He was president of Bowdoin College 1820-1839; author of *American Biographical and Historical Dictionary; a Supplement to Webster's Dictionary; Poems*, etc.

Allentown, county seat of Lehigh co., Pa., 60 m. n. w. of Philadelphia; on the Lehigh river, and on the Lehigh Valley, Central of New Jersey and Philadelphia & Reading railroads. It has extensive manufactures of iron, steel, cement, cigars and thread; is one of the largest producers of furniture in the United States, and is second to Paterson in the manufacture of silks. The city was laid out about 1752 by Chief Justice William Allen; in 1811, it became a city under the name of Northampton; in 1838, its original name was restored. It is the seat of Muhlenberg College (Lutheran) and of Allentown College for Women. Pop. 1900, 35,416.

Alliance, city and railroad junction in Stark co., Ohio; 57 m. s. e. of Cleveland; on the Mahoning river, and on the Lake Erie, Alliance & Wheeling and the Pennsylvania Co. railroads. Alliance has a large steel plant, white lead works, and extensive manufactures of heavy machinery, including reapers, gun carriages, boilers and pumps. The town was settled in 1838. Pop. 1900, 8,974.

Allibone, SAMUEL AUSTIN, LL. D. (1816-1889), an American author. He compiled a most useful *Critical Dictionary of English Literature and British and American Authors*.

Allier (ál-lê-ä), a central department of France. It has extensive beds of coal as well as other minerals, which are actively worked, there being several flourishing centers of mining and manufacturing enterprise; mineral waters at Vichy, Bourbon, L'Archambault, etc. Large numbers of sheep and cattle are bred. Area 2,822 sq. mi. Capital, Moulins. Pop. 424,582.

Alligator, a genus of reptiles of the crocodile family, differing from the true crocodiles in having a shorter and flatter head, in having cavities or pits in the upper jaw, into which the long canine teeth of the under jaw fit, and in having the feet much less webbed. Their habits are less aquatic. They are confined to the warmer parts of America, where they frequent swamps and marshes, and may be seen basking on the dry ground during the day in the heat of the sun. They are most active during the night when they make a loud bellowing. The largest of these animals grow

Alloway

to the length of 18 or 20 feet. They are covered by a dense armor of horny scales, impenetrable by a rifle-ball, and have a huge mouth, armed with strong conical teeth. They swim with wonderful celerity, impelled by their long, laterally-compressed, and powerful tails. On land their motions are proportionally slow and embarrassed because of the length and unwieldiness of their bodies and the shortness of their limbs. They live on fish, and any small animals or carrion, and sometimes catch pigs on the shore, or dogs which are swimming. They even sometimes make man their prey. In winter they burrow in the mud of swamps and marshes, lying torpid till the warm weather. The female lays a great number of eggs, which are deposited in the sand or mud, and left to be hatched by the heat of the sun, but the mother alligator is very attentive to her young. The most fierce and dangerous species is that found in the southern part of the U. S., having the snout a little turned up, slightly resembling that of the pike. The alligators of S. A. are there very often called *Caymans*. One species is known also as *Spectacled Cayman*, from the prominent bony rim surrounding the orbit of each eye. The flesh of the alligator is sometimes eaten.

Alligator-pear, an evergreen tree of the natural order Lauraceæ, with a fruit resembling a large pear, 1 to 2 lbs. in weight, with a firm marrow-like pulp of a delicate flavor; called also avocado-pear, or subaltern's butter. It is a native of tropical America and the West Indies.

Allison, WILLIAM B., b. in Wayne co. O., 1829, practised law in Ohio until 1857, when he removed to Dubuque, Ia. He served in Congress as a Republican 1863-1871. In 1873 he was elected to the U. S. Senate, and re-elected in 1878, 1884, 1890, and 1896.

Alliteration, the repetition of the same letter at the beginning of two or more words immediately succeeding each other, or at short intervals; as *many men, many minds; death defies the doctor; "Apt alliteration's artful aid."* "Puffs, powders, patches, bibles, billet-doux." In the ancient German and Scandinavian and in early English poetry alliteration took the place of terminal rhymes, the alliterative syllables being made to recur with a certain regularity in the same position in successive verses. So far has alliteration sometimes been carried that long compositions have been written every word of which commenced with the same letter.

Allo'dium, land held in one's own right, without any feudal obligation to a superior or lord. See *Feudal System*.

Allopathy, the name applied by homœopaths to systems of medicine other than their own; Hahnemann's principle being that "like cures like," he called his own system *homœopathy*, and other systems *allopathy*. See *Homœopathy*.

Al'loway, a parish of Scotland, now included in Ayr parish. Here Robert Burns was born in 1759, and the "auld haunted kirk," near his birthplace, was the scene of the dance of witches in *Tam O' Shanter*.

Alloy, a substance produced by melting together two or more metals, sometimes a definite chemical compound, but more generally merely a mechanical mixture. Most metals mix together in all proportions, but others unite only in definite proportions, and form true chemical compounds. Others again resist combination, and when fused together form not a homogeneous mixture but a conglomerate of distinct masses. The changes produced in their physical properties by the combination of metals are very various. Their hardness is in general increased, their malleability and ductility impaired. The color of an alloy may be scarcely different from that of one of its components, or it may show traces of neither of the two. Its specific gravity is sometimes less than the mean of that of its component metals. Alloys are always more fusible than the metal most difficult to melt that enters into their composition, and generally even more so than the most easily melted one. Newton's fusible metal, composed of three parts of tin, two or five parts of lead, and five or eight parts of bismuth, melts at temperatures varying from 198° to 210° F. (and therefore in boiling water); its components fuse respectively at the temperatures 442°, 600°, and 478° F. Sometimes each metal retains its own fusing point. With a few exceptions metals are not used in a pure state. Printers' types are made from an alloy of lead and antimony; brass and a numerous list of other alloys are formed from copper and zinc; bronze from copper and tin.

All Saints' Day, a festival of the Christian Church, instituted in 835, and celebrated on November 1 in honor of the saints in general.

All Souls' Day, a festival of the Catholic Church, instituted in 998, and observed on November 2 for the relief of souls in purgatory.

Allspice (al'spīs) (or Pimenta), is the dried berry of a West Indian species of myrtle, a beautiful tree with white and fragrant aromatic flowers and leaves of a deepshining green. Pimenta is thought to resemble in flavor a mixture of cinnamon, nutmegs, and cloves, whence the popular name of *allspice*; it is also called Jamaica pepper. It is employed in cookery, also in medicine as an agreeable aromatic, and forms the basis of a distilled water, a spirit, and an essential oil.

Allston, WASHINGTON (1799–1843), an American painter, b. in South Carolina. He won much fame in England, and returning to America died. His *Belshazzar's Feast* is one

of the masterpieces possessed by the Boston Athenæum. In style he imitated the Venetian School and has been called the "American Titian."

Alluvium, deposits of soil, collected by the action of water, such as are found in valleys and plains, consisting of loam, clay, gravel, etc., washed down from the higher grounds. Great alterations are often produced by alluvium—deltas and whole islands being often formed by this cause. Much of the rich land along the banks of rivers is alluvial in its origin.

Alma, a small river of Russia, in the Crimea, celebrated from the victory gained by the allied British and French over the Russians, 1854.

Al'maden, Cal., about 60 mi. s.e. of San Francisco, with rich quicksilver mines, the product of which has been largely employed in gold and silver mining. It was so named after Almaden, in Spain, where much quicksilver was mined.

Alma'gro, DIEGO DE (1475–1538), Spanish "Conquistador," a foundling. He took part with Pizarro in the conquest of Peru, and after frequent disputes with Pizarro about their respective shares in their conquests led an expedition against Chile, which he failed to conquer. On his return a struggle took place between him and Pizarro, in which Almagro was finally overcome, taken prisoner, strangled, and afterward beheaded. He was avenged by his son, who raised an insurrection in which Pizarro was assassinated in 1541. The younger Almagro was put to death in 1542 by De Castro, the new viceroy of Peru.

Al'manac, a calendar, in which are set down the rising and setting of the sun, the phases of the moon, the most remarkable positions and phenomena of the heavenly bodies, for every month and day of the year; also the several fasts and feasts to be observed in the church and state, etc., and often much miscellaneous information likely to be useful to the public. The term is of Arabic origin, but the Arabs were not the first to use almanacs. In England they are known from the fourteenth century, there being several English almanacs of that century existing in MS. They became generally used in Europe within a short time after the invention of printing. Their effects in France were found so mischievous, from the pretended prophecies which they published, that Henry III in 1579 forbade any predictions to be inserted in them relating to civil affairs, whether those of the state or of private persons. During the civil war of Charles I, and thence onward, English almanacs were conspicuous for the boldness of their astrological predictions, and their determined perpetuation of popular errors. The most famous English almanac was *Poor Robin's Almanack*, which was published from 1663 to 1775. In 1828 the Society for the Diffusion of Useful Knowledge, by publishing the *British Almanac*, took the lead in the production of an unexceptional almanac in Great Britain. The circulation of almanacs was cramped by the



Allspice.

very heavy duty of one shilling and three pence per copy till 1834, when this duty was abolished. About 200 new almanacs were started immediately on the repeal. Almanacs from their periodical character, are now more and more used as vehicles for conveying statistical and other useful information for the inhabitants of a particular country or district, or for a particular class or party. Some of the almanacs that are regularly published every year are almost indispensable to men engaged in official, mercantile, literary, or professional business. Such in Great Britain are *Thom's Official Directory of the United Kingdom*, the *British Almanac*, *Oliver and Boyd's Edinburgh Almanac*, and *Whitaker's Almanac*. The first popular almanac in America is believed to have emanated from *Bradford's* press at Philadelphia, in 1687. Benjamin Franklin's *Poor Richard's Almanac*, first issued in 1732, had a popularity for a quarter of a century. Many leading newspapers, not a few religious denominations, and several trades and professions now issue excellent popular almanacs at inexpensive rates. The *Almanach de Gotha*, which has appeared at Gotha since 1764, contains information regarding the reigning families and governments, the finances, commerce, population, etc., of the different states throughout the world. It is published both in French and in German.

The *Nautical Almanac*, or the *American Astronomical Ephemeris*, is published by the U. S. Bureau of Navigation annually. It embraces all the elements necessary for determining at any time the absolute and relative places of the sun, moon, and seven principal planets and of many of the fixed stars, also several different series of phenomena for the determination of longitudes and latitudes, the distances of the moon from fixed stars and planets, eclipses, etc. To these are added rules and tables for practical use in nautical astronomy, land observations, and tables of tides. It is a text-book for the navigator and no sailor leaves the American shore without it. It informs him of his place on the ocean where there are no other guides than the sun and stars. The computations are made three years in advance and could be made still farther if necessary, but no cruise is made which lasts longer than that time. A *Nautical Almanac* is published annually by the British government and was formerly used by American sailors. It was first published in 1767. The French *Connaissance des Temps* is similar in purpose and character to the American and English publications. The German government also publishes a nautical almanac.

Al'mandine, a red, transparent variety of garnet. It is found chiefly in Alabanda, Caria, hence its name. The same name is applied to a variety of ruby. See colored plate, *Gems*.

Alma-Tad'ema, LAWRENCE, Dutch painter, born in 1836, resident since 1870 in England, where he is a naturalized subject. In 1876 he was elected an associate of the Royal Academy, in 1879, an academician; he is also

a member of various foreign academies. He is especially celebrated for his pictures of ancient Roman, Greek, and Egyptian life, which are painted with great realism and archæological correctness.

Almeida (äl-mä'i-dä), one of the strongest fortresses in Portugal, in the province of Beira, near the Spanish border, on the Coa. Pop. 2,000. Taken by Masséna from the English in 1810; retaken by Wellington in 1811.

Almeida (däl-mä'i-dä), FRANCISCO DE (1450-1510), first Portuguese viceroy of India. He fought against the Moors, and being appointed governor of the new Portuguese settlements on the African and Indian coasts, he sailed for India in 1505. In Africa he took possession of Quiloa and Mombas, and in the East he conquered Cananor, Cochin, Calicut, etc., and established forts and factories. His son Lorenzo discovered the Maldives and Madagascar, but perished in an attack made on him by a fleet sent by the sultan of Egypt, with the aid of the Porte and the Republic of Venice. Having signally defeated the Mussulmans (1508), he sailed for Portugal, but was killed in a skirmish.

Almeria (äl-mä-rä'à), a fortified seaport of southern Spain, capital of province Almeria, with an important trade, exporting lead, esparto, barilla, etc. The province, which has an area of 3,300 sq. mi., is generally mountainous, and rich in minerals. Pop. of town 40,323; of province, 349,854.

Almohades (äl'mo-hädz), an Arabic or Moorish dynasty that ruled in Africa and Spain in the twelfth and thirteenth centuries. They overthrew the Almoravides in Spain, but themselves received a defeat in 1212 from which they did not recover, and in 1269 were overthrown in Africa.

Almond (ä'mund), the fruit of the almond tree, a tree which grows usually to the height of 20 feet, and is akin to the peach, nectarine, etc. It has beautiful pinkish flowers that appear before the leaves, which are oval,



Almond. a.—flower. b.—fruit.

pointed, and delicately serrated. It is a native of Africa and Asia, naturalized in southern Europe, and cultivated in England for its beauty. The fruit is a drupe, ovoid, and with downy, outer surface; the fleshy covering is

Almoravides

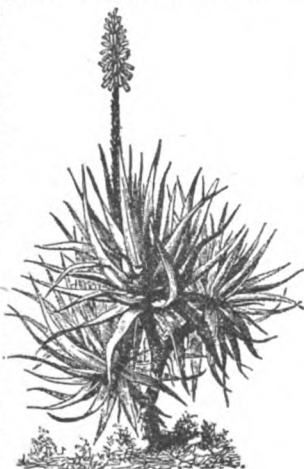
tough and fibrous; it covers the compressed, wrinkled stone enclosing the seed or almond within it. There are two varieties, one sweet and the other bitter. The chief kinds of sweet almonds are the Valencian, Jordan, and Malaga. Bitter almonds come from Magador, and besides a fixed oil they contain a substance called *emulsin*, and also a bitter crystalline substance called *amygdalin*, which, acting on the emulsin, produces prussic acid, whence the aroma of bitter almonds when mixed with water. *Almond-oil*, a bland fixed oil, is expressed from the kernels of either sweet or bitter almonds, and is used by perfumers and in medicine. A poisonous essential oil is obtained from bitter almonds, which is used for flavoring by cooks and confectioners, also by perfumers and in medicine.

Almo'ravides (-vidz), a Moorish dynasty which arose in northwestern Africa in the eleventh century, and having crossed the Straits of Gibraltar, gained possession of all Arabic Spain, but was overthrown by the Almohades in the following century.

Aloe (al'ō), the name of a number of plants belonging to the genus *Aloe*, some of which are not more than a few inches, while others are 30 feet and upward in height; natives of Africa and other hot regions; leaves fleshy, thick, and more or less spinous at the edges or extremity; flowers with a tubular corolla. Some of the larger kinds are of great use, the fibrous parts of the leaves being made into cordage, fishing nets and lines, cloth, etc. The juice of several species is used in medicine, under the name of *aloes*, forming a bitter purgative. The principal drug-producing species are, the Socotrine aloe, the Barbadoes aloe, the Cape aloe, etc. A beautiful violet color is afforded by the leaves of the Socotrine aloe. The American aloe (see *Agave*) is a different plant altogether; as are also the aloes or lign-aloes of Scripture. *Aloe fiber* is obtained from species of *Aloe*, *Agave*, *Yucca*, etc., and is made into coarse fabrics, ropes, etc.

Aloes-wood, Eagle-wood, the inner portion of the trunk of forest trees, found in tropical Asia, and yielding a fragrant resinous substance, which, as well as the wood, is burned for its perfume. Another tree also produces aloes-wood. This wood is supposed to be the lign-aloes of the Bible.

A'lost (or Aalst) (ä'lost, älst), a town of Bel-



Aloe.

Alphabet

gium, 15 mi. w. n. w. of Brussels. It has manufactures of lace, thread, linen, and cotton goods, etc., and a considerable trade. Pop. 29,251.

Alpac'a, a ruminant mammal of the camel tribe, a native of the Andes, especially of the



Alpaca.

mountains of Chile and Peru, and so closely allied to the llama that by some it is regarded rather as a smaller variety than a distinct species. It has been domesticated, and remains also in a wild state. In form and size it approaches the sheep, but has a longer neck. It is valued chiefly for its long, soft, and silky wool, which is straighter than that of the sheep, and very strong, and is woven into fabrics of great beauty, used for shawls, clothing for warm climate, coat-linings, and umbrellas, and known by the same name. Its flesh is pleasant and wholesome.

Alpena, Alpena co., Mich., 130 mi. n. e. of Saginaw City. It is an important lumber center, has also two foundries and two banks. Pop. 1900, 11,802.

Alpes (âlp), the name of three departments in the s. e. of France, all more or less covered by the Alps or their offshoots. These are BASSES ALPES; area 2,685 sq. mi.; capital, Digne; pop. 129,494. — HAUTES-ALPES (ôt-âlp) (Upper Alps), area 2,158; capital, Gap; pop. 122,924. — ALPES-MARITIMES (âlp-mâ-ri-têm) (Maritime Alps). It produces in the south, cereals, vines, olives, oranges, citrons, and other fruits; and there are manufactories of perfumes, liquors, soap, etc., and valuable fisheries. It is a favorite resort for invalids. Area 1,482 sq. mi.; capital, Nice; pop. 238,057.

Al'pha and **O'mega**, the first and last letters of the Greek alphabet, sometimes used to signify the beginning and the end, or the first and the last of anything; also as a symbol of the Divine Being. They were also formerly the symbol of Christianity, and engraved accordingly on the tombs of the ancient Christians.

Al'phabet (from *Alpha* and *Beta*, the first two letters of the Greek alphabet), the series of characters used in writing a language, and intended to represent the sounds of which it consists. The English alphabet, like most of those of modern Europe, is derived directly from the Latin, the Latin from the ancient

Greek, and that from the Phœnician, which again is believed to have had its origin in the Egyptian hieroglyphics, the Hebrew alphabet also having the same origin. The names of the letters in Phœnician and Hebrew must have been almost the same, for the Greek names, which, with the letters, were borrowed from the former, differ little from the Hebrew. By means of the names we may trace the process by which the Egyptian characters were transformed into letters by the Phœnicians. Some Egyptian character would, by its form, recall the idea of a house, for example, in Phœnician or Hebrew, *beth*. This character would subsequently come to be used wherever the sound *b* occurred. Its form might be afterward simplified, or even completely modified, but the name would still remain, as *beth* still continues the Hebrew name for *b*, and *beta* the Greek. Our letter *m*, which in Hebrew was called *mem*, water, has still a considerable resemblance to the zigzag, wavy line which had been chosen to represent water, as in the zodiacal symbol for *Aquarius*. The letter *o*, of which the Hebrew name means eye, no doubt originally intended to represent that organ. While the ancient Greek alphabet gave rise to the ordinary Greek alphabet and the Latin, the Greek alphabet of later times furnished elements for the Coptic, the Gothic, and the old Slavic alphabets. The Latin characters are now employed by a great many nations, such as the Italian, the French, the Spanish, the Portuguese, the English, the Dutch, the German, the Hungarian, the Polish, etc., each nation having introduced such modifications or additions as are necessary to express the sound of the language peculiar to it. The Greek alphabet originally possessed only sixteen letters, though the Phœnician had twenty-two. The original Latin alphabet, as it is found in the oldest inscriptions, consisted of twenty-one letters. The German alphabet consists of the same letters as the English, but the sounds of some of them are different. Anciently certain characters called *Runic* were made use of by the Teutonic nations, to which some would attribute an origin independent of the Greek and Latin alphabets. While the alphabets of the west of Europe are derived from the Latin, the Russian, which is very complete, is based on the Greek, with some characters borrowed from the Armenian. The Sanskrit or Devanagari alphabet is one of the most remarkable alphabets of the world. As now used it has fourteen characters for the vowels and diphthongs, and thirty-three for the consonants, besides two other symbols. Our alphabet is a very imperfect instrument for what it has to perform, being both defective and redundant. An alphabet is not essential to the writing of a language, since ideograms or symbols may be used instead, as in Chinese.

There is a remarkable Indian alphabet which was invented by See-quah-yah, of the Cherokee tribe. This Indian was confined to his cabin by a swollen knee, and was set to thinking whether the mysterious power of the "talking leaf" was the gift of the Great Spirit

to the white man or the discovery of the white man himself. His mind was directed to the mystery of speaking by letters, the name of which of course was not to be found in his language. From the cries of wild beasts, the sound of mocking-birds, the voices of his children and companions he observed that feelings and passions were conveyed by direct sound from one intelligent being to another. He immediately set about to ascertain all the sounds in the Cherokee language. In this labor he was aided by the more acute ears of his wife and children. At first he attempted to use pictorial signs, and images of birds and beasts to convey the different sounds in their language. He soon abandoned this method as difficult or impossible, and invented arbitrary signs without any regard to appearances, except such as might assist in recollecting them and distinguishing them from each other. His first alphabet consisted of about two hundred characters. This proved to be too cumbersome, and with the aid of his daughter, he reduced them at last to eighty-six, which number was used afterward. He perfected these characters in appearances, although he had no pen, making his characters on bark with a knife or nail. He sent to the Indian agent for paper and pen, made ink from the bark of the forest trees, and, after seeing the construction of the pen, he soon made a supply. His alphabet invented, he next proceeded to demonstrate to his people that he had made a discovery. His daughter, who was his only pupil, was sent out of hearing while he asked his friends to name a word or sentiment, which he put down. The girl was then called back and read what he had written. The father then retired, and the daughter wrote. This satisfied his companions of the discovery. Several of the brightest young men of the tribe were selected, to whom See-quah-yah communicated the mystery. This required some months, and at length they offered themselves for examination. The tribe watched for the results with anxiety. The youths were separated from their master and from each other and carefully watched. The uninitiated conducted the examination, which proved in every way successful. A great feast was ordered in honor of See-quah-yah, who at once became philosopher and chief. He continued in his labors and discovered numbers. The U. S. Government had a font of type cut for his alphabet, and a newspaper called "The Cherokee Phoenix," printed, partly in the Cherokee language and partly in English, was established. Many of the Cherokees were able to read both languages.

Alphon'so, the name of a number of Portuguese and Spanish kings. The name is borne by the present ruler of Spain, Alphonso XIII, born May 17, 1886, nearly six months after the death of his father, Alphonso XII. He is a Bourbon, a descendant of Louis XIV of France.

Alps, the highest and most extensive mountain-chain in Europe, forming the water-shed between the river-systems of the Mediterranean

Alps

near Sea and the Atlantic Ocean. It includes parts of five countries; viz.: portions of northern Italy, southeastern France, southern Germany, western Austria-Hungary, and most of Switzerland. The range is about 600 miles long, and from 90 to 180 miles wide. Its average height is about 7,700 feet; the highest peaks are Mont Blanc, 15,781 feet, on the Franco-Italian border, and Monte Rosa, 15,217, in Switzerland. The system of ranges is now commonly grouped under Eastern, Western, and Central Alps. The general form of the Alps is that of a crescent; from the principal chains spurs extend to the Apennines, the Vosges, the Harz, the Balkans, and the Carpathians. The line of perpetual snow begins at a line about 8,000 to 9,000 feet above the sea-level, more than 400 peaks rising to this altitude. From these peaks there descend to the valleys below enormous masses of partially melted snow and pulverized ice, constantly augmented by the masses from behind, which acquire a moving force that nothing can resist. Finally they reach a point where the sun melts them and become the sources of mountain rivers. The largest glacier is the "Mer de Glace" on the northern slope of Mont Blanc, and is 15 miles long, 3 to 6 miles wide, and 80 to 120 feet thick. The Rhône Glacier is one of the most famous. The Helvetic Alps in Western Switzerland, on both sides of the Rhone, are the portion most visited and afford the most beautiful mountain scenery of Europe. Among their peaks are the Jungfrau and the Finsteraarhorn. The dangerous ascent of Mont Blanc was first made in 1786 by a Frenchman, Jacques Balmat. The atmospheric conditions of the Alps produce at certain points most interesting optical illusions, sometimes very beautiful. The Alps were formerly considered well-nigh impassable, and many perished in the attempt. Hannibal's famous passage was reckoned one of his greatest feats. There are now good roads over most of the passes, some of which, however, are exceedingly dangerous. The chief passes connect Switzerland with Italy, and occupy 8 to 15 hours in crossing. One of the first famous roads was that built by Napoleon, 1803-10, over Mt. Cenis, at a height of 6,773 feet. The Mont Cenis tunnel, connecting France and Italy, is 14 miles from this road. It was built 1861-70 and is $7\frac{1}{4}$ miles long. The celebrated St. Gothard Pass is 6,935 feet high, and has been crossed by a carriage road since 1823. The great tunnel of St. Gothard, connecting Luzerne and Milan, is the longest in the world, $9\frac{1}{4}$ miles. At its central point it is 3,786 feet high. This tunnel was built 1872-82, by the contributions of Italy, Switzerland, and Germany. Other famous passes are the Col de Balme, celebrated for its view of Mont Blanc, the little St. Bernard, one of the oldest and easiest, and the Great St. Bernard, famed for its inn and dogs. The geological structure of the Alps has been a subject of interesting investigation, which was greatly aided by the building of the tunnels. Owing to their great

Alsace-Lorraine

height, the vegetation of the Alps is remarkably varied. At 6,500 feet all the vegetation of the plains has disappeared, including maize, cereals, common fruit, and forest trees. Between 7,500 and 8,500 feet a very rich pasturage and the peculiar "Alpine flora" appear. Animal life in many forms is abundant. Peculiar to Alpine regions are the chamois and the mountain goat.

Alsace-Lorraine, an imperial territory of the German Empire, ceded by France in 1871 as a result of the Franco-German war; area 5,668 sq. mi.; pop. 1,603,506; capital, Strasburg. The provinces of Alsace and Lorraine have been "debatable ground" between France and Germany for many centuries. In the ninth century they formed part of the kingdom of Lothar, grandson of Charlemagne, and ever since the partition of his dominions between France and the German Empire (869) portions of their territory, including as it does the borders of the two countries, have been the recurring subject of dispute, belonging to whichever power happened to have the mastery. At the close of the Roman period, in the fifth century, Alsace was filled up by Germanic settlers, and the population has remained distinctly Germanic ever since. It took its name from the river Ill, the settlers being called Ill-Sassen. In 924 Henry the Fowler annexed Alsace to the German Empire. During the tenth century it was claimed as a French possession, but never regained, and after the extinction of the Carolingian line it remained as an undisputed possession for several centuries. It was at various times an Alemannian or Sualian duchy. During the Reformation period a violent outbreak of the Alsatian peasantry was quelled (1525) by Duke Anthony III. Giselbert, Duke of Lorraine, had been attached to Charles the Simple of France, but during the disorders which marked the reign of that king, he voluntarily attached himself to the emperor Henry (925), the latter became his father-in-law, and Lorraine was formally incorporated in the empire, where it remained until 1734. Otto the Great gave the province to his brother Brun, Bishop of Cologne (952), Duke Conrad having rebelled and been subdued. It was afterward divided into Lower and Upper Lorraine. The former subsequently became known as Brabant, and was a possession of the Dukes of Burgundy. Upper Lorraine retained its name and became the modern province. About the middle of the eleventh century the emperor Henry III conferred it upon Gérard of Alsace, the founder of a long line of dukes who ruled it, for the most part, down to the eighteenth century. During the decadence of the empire and the supremacy of France under Louis XIII, Louis XIV, and Louis XV, parts of northern Lorraine were seized, including principally the bishoprics of Metz, Toul, and Verdun. During the latter part of the thirty years' war France sought to secure the Rhinelands, and by the treaty of Westphalia (1648) these three bishoprics, together with most of Alsace, were confirmed to Louis XIV. During the war of the Palatinate (1689-97) Louis XIV seized

Alsen

more of the Rhine provinces, but was compelled to give much of it back to the empire by the treaty of Ryswick (1697). He retained the city of Strassburg, taken 1681, and had now acquired entire Alsace. After the war of the Polish Succession, the king of Poland, Stanislas Leszczynski, received Lorraine, which was to be annexed to France at his death. This occurred in 1766, and Lorraine became a part of France. At the Congress of Vienna (1814-15) Prussia sought to recover Alsace and Lorraine for Germany, but obtained only a small portion on the Rhine. In the Franco-German war of 1870-71, there was a strong national feeling in Germany for the recovery of these provinces, to which she was historically entitled, and here was the principal battle-ground. By the treaty of Frankfurt, Germany recovered Alsace and German Lorraine, in general the part between the Vosges Mountains and the Moselle, together with Metz and the adjacent district. Alsace-Lorraine became a possession of the whole empire and not of any particular state, and is under direct control of the imperial government, vested in a provincial committee of 58 members. It has 15 seats in the Reichstag. The prevailing language is German, except in portions of Lorraine. Both languages are commonly understood. The German educational system is now well established. Seventy-eight per cent. of the population is Roman Catholic. The soil is very fertile, producing principally grain, wine, and tobacco. The manufactures and mines of coal and iron are important.

Al'sen, an island of Prussia on the east coast of Schleswig-Holstein. Pop. 22,500.

Altai Mountains (äl'ti), an important Asiatic system on the borders of Siberia and Mongolia, partly in Russian and partly in Chinese territory. The highest summit is Byeluka, height 11,000 feet. The Altai is exceedingly rich in minerals, including gold, silver, copper, and iron. The inhabitants are chiefly Russians and Kalmuks. The chief town is Barnaul.

Al'tenburg, a town of Germany, capital of Saxe-Altenburg, 23 miles south of Leipsic. It has manufactures of cigars, woolen yarn, gloves, hats, musical instruments, glass, brushes, etc. Pop. 1900, 37,100.

Al'tiscope, an instrument consisting of an arrangement of mirrors in a vertical framework, by means of which a person is enabled to overlook an object (a parapet, for instance) intervening between himself and any view that he desires to see, the picture of the latter being reflected from a higher to a lower mirror, where it is seen by the observer.

Al'titude, in mathematics the perpendicular height of the vertex or apex of a plane figure or solid above the base. In astronomy it is the vertical height of any point or body above the horizon. It is measured or estimated by the angle subtended between the object and the plane of the horizon, and may be either *true* or *apparent*. The *apparent* altitude is that which is obtained immediately from observation; the *true* altitude, that which results from correct-

Alum

ing the apparent altitude, by making allowance for parallax, refraction, etc.

Alton, Madison co., Ill., on Mississippi River, 15 mi. n.w. of St. Louis. Railroads: Chicago & Alton; C. C. C. & St. L. (Big 4); Burlington, Keokuk & Northwestern; C. B. & Q.; M. K. & T.; C. St. L. & St. P. (Bluff Line). Industries: glass, three flouring-mills, iron foundry, woolen-mill, plow company, two carriage factories, lime and cement works, firebrick, tile works, powder-mill, packing, and mining-tool works. Alton became a city in 1837. Population in 1900, 14,210.

Al'tona, an important commercial city in the Prussian province of Schleswig-Holstein, adjoining Hamburg, with which it virtually forms one city. It is a free port, and its commerce, both inland and foreign, is large, being quite identified with that of Hamburg. Pop. 148,944.

Altoona, city in Blair co., Pa., on the Pennsylvania R. R., 117 m. e. of Pittsburgh; beautifully situated at the eastern base of the Allegheny Mountains, having an elevation of 1,180 feet above sea level. Altoona was founded in 1850 by the Pennsylvania Railroad Company. The machine shops of this railroad are located in the city; they employ about 7,000 men, and manufacture locomotives, passenger coaches and freight cars. The city contains a hospital, a public library and a park. The famous Horse-Shoe Bend is near the city. In 1877, the great railway strike caused so much excitement in Altoona that troops had to be ordered out to protect the company's property. Pop. 1900, 38,973.

Al'tori, a small town of Switzerland, capital of the canton of Uri, beautifully situated, near the Lake of Luzern, amid gardens and orchards, and memorable as the place where, according to legend, William Tell shot the apple from his son's head. A colossal statue of Tell now stands here. Pop. 2,900.

Alto-Rilievo (äl'tô-rê-lê-ä'vo) "high relief," a term applied in regard to sculptured figures to express that they stand out boldly from the background, projecting more than half their thickness, without being entirely detached. In mezzo-rilievo, or middle relief, the projection is one half, and in basso-rilievo, or bas-relief, less than one half. Alto-rilievo is further distinguished from mezzo-rilievo by some portion of the figures standing usually quite free from the surface on which they are carved, while in the latter the figures, though rounded, are not detached in any part.

Alum is a crystalline compound containing the metals aluminum and potassium, together with sulphuric acid and water. A. is prepared from a bituminous shale containing iron pyrites interspersed throughout its mass, found in the Lower Coal Measures, and technically called *alum ore*. In preparing A. from the ore, the latter is first roasted—that is, heated in contact with air. By this roasting the iron pyrites is oxidized to sulphate of iron, and sulphuric anhydride, which combines with the alumina contained in the ore to form sulphate of aluminum. The roasted mass is

Alumbagh

treated with water to dissolve out the two sulphates, and the solution obtained by this means evaporated to a suitable consistency, and mixed with chloride of potassium. A. and chloride of iron result, the former of which, being less soluble than the latter, is readily separated by crystallization. A. is a colorless crystalline substance of very astringent acid taste. Its solution reddens litmus. It is largely employed by dyers as a *mordant*. It is also used in preparing pigments called *lakes*. A. is used in medicine, and has been employed as an antiseptic. It is sometimes used to adulterate flour intended for making bread, as it appears to give the bread a firm consistency and white color. *Burnt A.* is A. from which the water has been driven off by heat.

Alumbagh (*a-lam-bäg'*), a palace and connected buildings in Hindustan, about 4 mi. s. of Lucknow, famous for its capture and defense by the British in the Indian mutiny.

Alu'mina, the single oxide of the metal aluminium. As found native it is called corundum; when crystallized, ruby or sapphire; when amorphous, emery. It is next to the diamond in hardness. In combination with silica it is one of the most widely distributed substances, as it enters in large quantity into the composition of granite, traps, slates, schists, clays, loams, and other rocks. The porcelain clays and kaolins contain about half their weight of this earth, to which they owe their most valuable properties. It has a strong affinity for coloring matters, which causes it to be employed in the preparation of the colors called *lakes* in dyeing and calico-printing. It combines with the acids and forms numerous salts, the most important of which are the sulphate and acetate, the latter of extensive use as a mordant.

Alumin'ium, a metal discovered in 1827, but nowhere found native, though as the base of alumina (which see) it is abundantly distributed. The mineral *cryolite*—a fluoride of aluminium and sodium—which is brought from Greenland, is one of the chief sources of aluminium. It is a shining white metal, of a color between silver and platinum, very light, weighing less than glass, and about one-fourth of silver (specific gravity, 2.56 cast, 2.67 hammered), not liable to tarnish or undergo oxidation in the air, very ductile and malleable, and remarkably sonorous. It forms several useful alloys with iron and copper; one of the latter (*aluminium-gold*) much resembles gold, and is made into cheap trinkets. Another, known as *aluminium bronze*, possesses great hardness and tenacity.

The process of extracting aluminium from clay requires a very fierce heat or a powerful electric current. In some of the factories an electric current of 14,000 amperes and 30 volts is generated. This terrific current is run into the reduction machines by means of heavy copper wires. The reduction machine consists of a huge crucible made of carbon blocks so as to be infusible. In the bottom of the crucible is a small tap-hole where the melted aluminium may be drawn out. The electrode

Alva

is constructed of heavy carbon plates so as to form a prism. This is fastened by a chain to a derrick and can be lowered into the crucible or furnace as fast as its end burns off. Before the process begins, chunks of copper are thrown into the crucible to form the negative electrode, then the purest obtainable alumina or clay is shoveled into the holes. The moment the electrode is lowered the connection is made and the terrific heat thus produced causes the alumina to give up its aluminium, which may be drawn off through the tap-hole. The clay is fed into the crucible as fast as the reduction process goes on and until the electrode has been entirely consumed. An ordinary aluminium furnace will produce about four hundred-weight in twenty-four hours, and about fifteen horse-power is necessary for each pound of aluminium produced per hour. Aluminium factories produce immense volumes of poisonous gases and for that reason must be more or less isolated. The uses of aluminium are rapidly increasing. It was first used in the manufacture of aluminium bronze, but now many common utensils are made from it. A process by which aluminium can be plated with copper and the plated metal be drawn or rolled to any degree of fineness will greatly extend the uses of aluminium, since the presence of the copper allows the plated metal to be readily soldered. The most extensive use of aluminium is as a reducing agent in the manufacture of steel. Aluminium is also taking the place of copper to quite an extent as a conductor of electricity; it has nearly as great a power of conductivity as copper, and is somewhat cheaper. Magnalium, an alloy of aluminium and magnesium, has been put upon the market recently. It takes a high polish, does not tarnish, and can be worked as easily as brass, qualities that adapt it to ornamental work.

Alum-root, the name given in America to two plants on account of the remarkable astringency of their roots, which are used for medical purposes.

Alum-slate, a slaty rock from which much alum is prepared; color, grayish, bluish, or iron-black; often possessed of a glossy or shining luster; chiefly composed of clay (silicate of alumina), with variable proportions of sulphide of iron, lime, bitumen, and magnesia.

Alum-stone, a mineral of a grayish or yellowish-white color, approaching to earthy in its composition, from which (in Italy) is obtained a very pure alum by simply subjecting it to roasting and lixiviation.

Al'va (or *Al'ba*), FERDINAND ALVAREZ, Duke of (1508-1582), Spanish statesman and general under Charles V and Philip II; fought in the wars of Charles V in France, Italy, Africa, Hungary, and Germany. He is remembered for his bloody and tyrannical government of the Netherlands (1567-73), which had revolted, and which he was commissioned by Philip II to reduce to entire subjection to Spain. Among his first proceedings was to establish the "Council of Blood," a tribunal which condemned all whose opinions were suspected, and whose riches were coveted. Many mer-

Alvarado

chants and mechanics emigrated to England. The counts Egmont and Horn, and other men of rank, were executed, and William and Louis of Orange had to save themselves in Germany. Resistance was quelled for a time, and the provinces of Holland and Zealand revolted against his tyranny. A fleet which was fitted out at his command was annihilated, and he was everywhere met with insuperable courage. He was recalled, and in 1573 he left the country, in which, as he boasted, he had executed 18,000 men. He was received with distinction in Madrid. Before his death he reduced all Portugal to subjection to his sovereign. It is said that during sixty years of warfare he never lost a battle and was never taken by surprise.

Alvarado (ál-vá-rá'dō), PEDRO DE, one of the Spanish "conquistadors," was born toward the end of the fifteenth century, and died in 1541. Having crossed the Atlantic he was associated (1519) with Cortez in his expedition to conquer Mexico; and was intrusted with important operations. In July, 1520, during the disastrous retreat from the capital after the death of Montezuma, the perilous command of the rear-guard was assigned to Alvarado. On his return to Spain he was received with honor by Charles V, who made him governor of Guatemala, which he had himself conquered. To this was subsequently added Honduras. He continued to add to the Spanish dominions in America till his death.

Alverstone, LORD (formerly Sir Richard Webster), (1842-), a distinguished English jurist. He was formerly attorney-general of the United Kingdom and British counsel in the Venezuela dispute. He became chief justice in 1900. In 1903 Lord Alverstone was president of the Alaska boundary commission.

Alwar (al-war'), a state of northwestern Hindustan, in Rajputana. Area 3,024 sq. mi. This semi-independent state has as its ruler a rajah with a revenue of about \$1,000,000; military force, about 5,000 infantry and 2,000 cavalry. Pop. 682,926.—**ALWAR**, the capital, is situated 80 mi. s.s.w. of Delhi. Pop. 49,867.

Amade'us, Duke of Aosta, second son of Victor Emmanuel of Italy, and brother of the present king, was born in 1845, and was chosen by the Cortes king of Spain in 1870, Queen Isabella having had to leave the country in 1868. His position was far from comfortable, however, and perceiving that, as a member of a foreign dynasty, he had little hope of becoming acceptable to all parties in the state, he abdicated in 1873 and returned to Italy.

Amal'fi, a seaport in southern Italy, 23 mi. from Naples, formerly a place of great commercial importance, in the Middle Ages enjoying a republican constitution of its own. Here arose the *Amalfian Code* of maritime law. Pop. 7,737.

Amal'gam, a name applied to the alloys of mercury with the other metals. One of them is the amalgam of mercury with tin, which is used to silver looking-glasses. Mercury unites very readily with gold and silver at ordinary temperatures, and advantage is

Amazon

taken of this to separate them from their ores, the process being called *amalgamation*. The mercury being properly applied dissolves and combines with the precious metal and separates it from the waste matters, and is itself easily driven off by heat.

Amarapura (a-ma-ra-pō'ra), a deserted city, once the capital of the Burmese Empire, on the left bank of the Irrawaddy, 10 mi. n.e. of Ava. In 1810 it was completely destroyed by fire, in 1839 it was visited by a destructive earthquake. In 1857 the seat of government was removed to Mandalay. The population in 1900 was 175,000.

Amaryllida'ceæ, an order of plants, generally bulbous, with a highly colored flower, natives of Europe and most of the warmer parts of the world. The order includes the snowdrop, the snow-flake, the daffodil, the belladonna-lily, the so-called Guernsey-lily the Brunsvigias, the blood-flowers of the Cape of Good Hope, different species of Narcissus, Agave (American aloe), etc. Many are highly prized in gardens and hothouses; the bulbs of some are strongly poisonous. See colored plate, Flowers.

Amasia (â-mâ-sē'â), a town in the north of Asia Minor, on the Irmak, 60 miles from the Black Sea, surmounted by a rocky height in which is a ruined fortress; has numerous mosques, richly-endowed Mohammedan schools, and a trade in wine, silk, etc. Amasia was a residence of the ancient kings of Pontus. Pop. 25,000.

Amati (â-mâ'tē), a family of Cremona who manufactured violins in the sixteenth and seventeenth centuries. Most of the violins made by them are of comparatively small size and flat model, and the tone produced by the fourth or G string is somewhat thin and sharp. Many of Niccolò Amati's violins are, however, of a larger size and have all the fullness and intensity of tone characteristic of those manufactured by Stradivario and Guarnerio.

Amatit'lan, a town in Central America, state of Guatemala, about 15 miles south of the city of Guatemala, a busy modern town, the inhabitants of which are actively engaged in the cochineal trade. There is a small lake of same name close to the town. Pop. 12,000.

Amauro'sis, a species of blindness, formerly called *guttaserena* (the "drop serene," as Milton, whose blindness was of this sort, called it), caused by disease of the nerves of vision. The most frequent causes are a long-continued direction of the eye on minute objects, long exposure to a bright light, to the fire of a forge, to snow, or irritating gases, overfulness of blood, disease of the brain, etc. If taken in time it may be cured or mitigated; but confirmed amaurosis is usually incurable.

Am'azon, a river of South America, the largest in the world, formed by a great number of sources which rise in the Andes; length, including windings, between 3,000 and 4,000 mi.; area of drainage basin 2,300,000 sq. mi. It enters the Atlantic under the equator by a mouth 200 miles wide. In

Amazonas

its upper course navigation is interrupted by rapids, but from its mouth upward for a distance of 3,300 mi. (mostly in Brazil) there is no obstruction. It receives the waters of about 200 tributaries, 100 of which are navigable, and seventeen of these 1,000 to 2,300 miles in length. The Amazonian water system affords some 50,000 miles of river suitable for navigation. The rapidity of the river is considerable, especially during the rainy season (January to June), when it is subject to floods; but there is no great fall in its course. The tides reach up as far as 400 miles from its mouth. The singular phenomenon of the *bore*, or as it is called on the Amazon the *pororoca*, occurs at the mouth of the river at spring-tides on a grand scale. The river swarms with alligators, turtles, and a great variety of fish. Steamers and other craft ply on the river, the chief center of trade being Para, at its mouth. The Amazon was discovered by Yanez Pinçon in 1500, but the stream was not navigated by any European till 1540, when Francis Orellana descended it. Orellana stated that he found on its banks a nation of armed women, and this circumstance gave the name to the river.

Amaz'onas, the largest province of Brazil, traversed by the Amazon and its tributaries. Area 753,000 sq. mi.; pop. 80,000.

Amazons, according to an ancient Greek tradition, the name of a community of women, who permitted no man to reside among them, fought under the conduct of a queen, and long constituted a formidable state. They were said to burn off the right breast that it might not impede them in the use of the bow. Several nations of Amazons are mentioned, the most famous being those who dwelt in Pontus, who built Ephesus and other cities. Their queen, Hippolyta, was vanquished by Hercules. They attacked Attica in the time of Theseus. They came to the assistance of Troy under their queen, Penthesilæa, who was slain by Achilles.

Amazu'lu. See *Zulus*.

Amba'la (Umball'a), a town of India, in the Punjab, with a flourishing trade in grain and other commodities. Total pop. 67,463.

Ambas'sador, a minister of the highest rank, employed by one prince or state at the court of another to manage the public concerns, or support the interests of his own prince or state, and representing the power and dignity of his sovereign or state. Ambassadors are *ordinary* when they reside permanently at a foreign court, or *extraordinary* when they are sent on a special occasion. When *Ambassadors extraordinary* have full powers, as of concluding peace, making treaties, and the like, they are called *plenipotentiaries*. Ambassadors are often called simply *ministers*. *Envoys* are ministers employed on special occasions, and are of less dignity than ambassadors. Until recently the U. S. sent no ambassadors to foreign countries, but were represented by ministers-plenipotentiary, appointed by the president, with approval of the Senate. In 1896 the ministers to Germany,

Ambleteuse

France, England, and Italy were raised to the rank of ambassadors.

Amba'to, a town of Ecuador, on the side of Chimborazo, 70 mi. s. of Quito. Pop. 12,000.

Am'ber, a semi-mineral substance of resinous composition, a sort of fossil resin, the produce of extinct Coniferae. It is usually of yellow or reddish-brown color; brittle; yields easily to the knife; is translucent, and possessed of a resinous luster. It burns with a yellow flame, emitting a pungent, aromatic smoke, and leaving a light carbonaceous residue, which is employed as the basis of the finest black varnishes. By friction it becomes strongly electric. It is found in masses from the size of coarse sand to that of a man's head, and occurs in beds of bituminous wood situated upon the shores of the Baltic and Adriatic Seas; also in Poland, France, Italy, and Denmark. It is often washed up on the Prussian shores of the Baltic, and is also obtained by fishing for it with nets. Sometimes it is found on the east coast of Britain, in gravel pits round London, also in the U. S.

Working in Amber.—The amber blocks are sawed into small blocks by an extremely thin saw. With the amber rough-shaped the worker puts in his lathe a disk file, a circular steel plate with radiating file sections on its face, thus the amber is reduced to the desired size. In making the mouthpiece for a pipe, for instance, the blocks of amber, after being brought nearly to the finished shape, are put in the lathe to be bored out. As the hole must be drilled in the exact center, the amber must be truly centered in the lathe. The hole for the bone screw which joins the mouthpiece and the pipe stem is bored out, and a screw thread cut in with a toothed tool. A curious thing about amber is that it will crack if a hole is bored straight through from one end. After the hole is bored the amber is brought down to the right size for the particular pipe stem for which it is intended and is then polished. Some of the mouthpieces are curved and this is done after the amber is shaped and bored. The straight mouthpiece is put into hot oil until it loses its stiffness and is then bent as desired. Rubber and horn mouthpieces are worked much as amber, but the tools employed are stronger and heavier. Amber is sold by the pound, the price varying from \$2 to \$75 per pound. There is no difference, so far as cost is concerned, between the clouded and the clear amber. Amberine is an imitation of amber as its name implies. It is tougher and stronger than amber.

Am'bergris, a substance derived from the intestines of the sperm-whale, and found floating on or near the shore; yellowish or blackish white; very light; melts at 140°, and is entirely dissipated on red-hot coals; is soluble in ether, volatile oils, and partially in alcohol, and is chiefly composed of a peculiar fatty substance. Its odor is very agreeable, and hence it is used as a perfume.

Ambleteuse (ân-bl-teuz), a small seaport of France, 6 mi. from Boulogne. Here James II landed on his flight from England in 1688;

and from its harbor Napoleon I prepared to despatch a flotilla of flat-bottomed boats for the invasion of Britain.

Amblyop' sis, a genus of blind fishes, containing only one species, found in the Mammoth Cave of Kentucky.

Amboy' na (Amboina, or Apon), one of the Molucca Islands in the Indian Archipelago, close to the large island of Ceram; area about 280 sq. mi. Here is the seat of government of the Dutch residency or province of Amboyna, which includes also Ceram, Booro, etc. It affords a variety of useful trees, including the cocoa-nut and sago palms. Cloves and nutmegs are the staple productions. The natives are mostly of Malayan race. The capital, also called Amboyna, is situated on the Bay of Amboyna, and is well built and defended by a citadel. The streets are planted on each side with rows of fruit-trees. It is a free port. Pop. 10,500. In 1607 Amboyna and the other Moluccas were taken by the Dutch from the Portuguese, and it was for some years the seat of government of the Dutch East Indies. Trade with the Moluccas was secured to the British by treaty in 1619, but the British establishment was destroyed and several persons massacred in 1623, an outrage for which no satisfaction was obtained till 1654 by Cromwell. Amboyna was taken by the British in 1796 and 1810, but each time restored to the Dutch. Pop. 30,000.

Amboyna Wood, a beautiful curled orange or brownish colored wood brought from the Moluccas.

Ambulance, a four or two wheeled wagon fitted up for the conveyance of injured persons. In the armies of the world the term is applied to movable field hospitals, especially those controlled by the Red Cross Society. Every principal city in America has its hospitals and police departments equipped with excellent ambulances in the charge of qualified surgeons. These vehicles having the right of way over other vehicles, respond to accident calls sent by the police, and render most efficient first aid to the injured as well as conveying them to hospitals or their homes. Ambulances are also provided for the conveyance of injured animals.

Amend' ment, a proposal brought forward in a meeting of some public or other body, either in order to get an alteration introduced on some proposal already before the meeting, or entirely to overturn such proposal. When amendments are made in either house of Congress upon a bill which passed the other, the bill, as amended, must be sent back to the other house. The Senate may amend money bills passed by the House of Representatives, but cannot originate such bills. The Constitution of the U. S. contains a provision for its amendments, as follows:—

“The Congress, whenever two thirds of both houses shall deem it necessary, shall propose amendments to this constitution; or, on the application of the legislatures of two thirds of the several states, shall call a convention for proposing amendments, which, in either case,

shall be valid to all intents and purposes, as part of this constitution, when ratified by the legislatures of three fourths of the several states, or by conventions in three fourths thereof, as the one or the other mode of ratification may be proposed by the Congress; provided, that no amendment which may be made prior to the year 1808 shall in any manner affect the first and fourth clauses in the ninth section of the first article; and that no state, without its consent, shall be deprived of its equal suffrage in the Senate.”

Amer' ica, or the New World, the largest of the great divisions of the globe except Asia, is washed on the west by the Pacific, on the east by the Atlantic, on the north by the Arctic Ocean, on the south tapers to a point. On the northwest it approaches within about 50 mi. of Asia, while on the northeast the island of Greenland approaches within 370 mi. of Iceland. America as a whole forms the two triangular continents of North and South America, united by the narrow Isthmus of Panama, and having an entire length of about 10,000 miles; a maximum breadth (in North America) of 3,500 miles; a coast line of 44,000 miles; and a total area, including the islands, of nearly 16,000,000, of which North America contains about 9,000,000 sq. mi. South America is more compact in form than North America, in this respect resembling Africa, while N. America more resembles Europe. Between the two on the east side is the great basin which comprises the Gulf of Mexico, the Caribbean Sea, and the West India Islands. Like Europe also N. America possesses numerous islands, while those of S. America are less important and confined almost to the southern extremity.

NORTH AMERICA.—The political divisions of N. A. are, the U. S. (including Alaska), Mexico, Canada, Greenland, and the Bermuda Islands.

Surface, Rivers, and Lakes.—North America naturally divides itself into five physical regions: 1. The table-land of Mexico, with the strip of low country on its eastern and western shores; 2. The plateau lying between the Rocky Mountains and the Pacific Ocean, a country with a mild and humid atmosphere as far north as the 55th parallel, but inhospitable and barren beyond this boundary; 3. The great central valley of the Mississippi, rich and well wooded on the east side; bare but not unfertile in the middle; dry, sandy, and almost a desert on the west; 4. The eastern declivities of the Alleghany Mountains, a region of natural forests, and of mixed but rather poor soil; 5. The great northern plain beyond the 50th parallel, four fifths of which is a bleak and bare waste, overspread with innumerable lakes, and resembling Siberia both in the physical character of its surface and the rigor of its climate. The loftiest mountains in North America are Mount McKinley, 20,464 ft.; Mount St. Elias, 19,500 ft., and Popocatepetl, 17,520 ft. The principal river systems are the Mississippi, the St. Lawrence, the McKenzie, and the Rio del Norte. The

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TYPE OF AMERICAN INDIANS. 1. Eskimo Woman (Labrador). 2. Mexican (Coast). 3. Mexican (U. S. A.). 4. Apache (U. S. A.). 5. Bellacoola or Bilchula. 6, 7. Pueblo (U. S. A.). 8, 9. Zapoteca (Mexico). 10, 11. Patagonian Woman.



TYPE OF AMERICAN INDIANS. — 1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72. 73. 74. 75. 76. 77. 78. 79. 80. 81. 82. 83. 84. 85. 86. 87. 88. 89. 90. 91. 92. 93. 94. 95. 96. 97. 98. 99. 100. 101. 102. 103. 104. 105. 106. 107. 108. 109. 110. 111. 112. 113. 114. 115. 116. 117. 118. 119. 120. 121. 122. 123. 124. 125. 126. 127. 128. 129. 130. 131. 132. 133. 134. 135. 136. 137. 138. 139. 140. 141. 142. 143. 144. 145. 146. 147. 148. 149. 150. 151. 152. 153. 154. 155. 156. 157. 158. 159. 160. 161. 162. 163. 164. 165. 166. 167. 168. 169. 170. 171. 172. 173. 174. 175. 176. 177. 178. 179. 180. 181. 182. 183. 184. 185. 186. 187. 188. 189. 190. 191. 192. 193. 194. 195. 196. 197. 198. 199. 200. 201. 202. 203. 204. 205. 206. 207. 208. 209. 210. 211. 212. 213. 214. 215. 216. 217. 218. 219. 220. 221. 222. 223. 224. 225. 226. 227. 228. 229. 230. 231. 232. 233. 234. 235. 236. 237. 238. 239. 240. 241. 242. 243. 244. 245. 246. 247. 248. 249. 250. 251. 252. 253. 254. 255. 256. 257. 258. 259. 260. 261. 262. 263. 264. 265. 266. 267. 268. 269. 270. 271. 272. 273. 274. 275. 276. 277. 278. 279. 280. 281. 282. 283. 284. 285. 286. 287. 288. 289. 290. 291. 292. 293. 294. 295. 296. 297. 298. 299. 300. 301. 302. 303. 304. 305. 306. 307. 308. 309. 310. 311. 312. 313. 314. 315. 316. 317. 318. 319. 320. 321. 322. 323. 324. 325. 326. 327. 328. 329. 330. 331. 332. 333. 334. 335. 336. 337. 338. 339. 340. 341. 342. 343. 344. 345. 346. 347. 348. 349. 350. 351. 352. 353. 354. 355. 356. 357. 358. 359. 360. 361. 362. 363. 364. 365. 366. 367. 368. 369. 370. 371. 372. 373. 374. 375. 376. 377. 378. 379. 380. 381. 382. 383. 384. 385. 386. 387. 388. 389. 390. 391. 392. 393. 394. 395. 396. 397. 398. 399. 400. 401. 402. 403. 404. 405. 406. 407. 408. 409. 410. 411. 412. 413. 414. 415. 416. 417. 418. 419. 420. 421. 422. 423. 424. 425. 426. 427. 428. 429. 430. 431. 432. 433. 434. 435. 436. 437. 438. 439. 440. 441. 442. 443. 444. 445. 446. 447. 448. 449. 450. 451. 452. 453. 454. 455. 456. 457. 458. 459. 460. 461. 462. 463. 464. 465. 466. 467. 468. 469. 470. 471. 472. 473. 474. 475. 476. 477. 478. 479. 480. 481. 482. 483. 484. 485. 486. 487. 488. 489. 490. 491. 492. 493. 494. 495. 496. 497. 498. 499. 500. 501. 502. 503. 504. 505. 506. 507. 508. 509. 510. 511. 512. 513. 514. 515. 516. 517. 518. 519. 520. 521. 522. 523. 524. 525. 526. 527. 528. 529. 530. 531. 532. 533. 534. 535. 536. 537. 538. 539. 540. 541. 542. 543. 544. 545. 546. 547. 548. 549. 550. 551. 552. 553. 554. 555. 556. 557. 558. 559. 560. 561. 562. 563. 564. 565. 566. 567. 568. 569. 570. 571. 572. 573. 574. 575. 576. 577. 578. 579. 580. 581. 582. 583. 584. 585. 586. 587. 588. 589. 590. 591. 592. 593. 594. 595. 596. 597. 598. 599. 600. 601. 602. 603. 604. 605. 606. 607. 608. 609. 610. 611. 612. 613. 614. 615. 616. 617. 618. 619. 620. 621. 622. 623. 624. 625. 626. 627. 628. 629. 630. 631. 632. 633. 634. 635. 636. 637. 638. 639. 640. 641. 642. 643. 644. 645. 646. 647. 648. 649. 650. 651. 652. 653. 654. 655. 656. 657. 658. 659. 660. 661. 662. 663. 664. 665. 666. 667. 668. 669. 670. 671. 672. 673. 674. 675. 676. 677. 678. 679. 680. 681. 682. 683. 684. 685. 686. 687. 688. 689. 690. 691. 692. 693. 694. 695. 696. 697. 698. 699. 700. 701. 702. 703. 704. 705. 706. 707. 708. 709. 710. 711. 712. 713. 714. 715. 716. 717. 718. 719. 720. 721. 722. 723. 724. 725. 726. 727. 728. 729. 730. 731. 732. 733. 734. 735. 736. 737. 738. 739. 740. 741. 742. 743. 744. 745. 746. 747. 748. 749. 750. 751. 752. 753. 754. 755. 756. 757. 758. 759. 760. 761. 762. 763. 764. 765. 766. 767. 768. 769. 770. 771. 772. 773. 774. 775. 776. 777. 778. 779. 780. 781. 782. 783. 784. 785. 786. 787. 788. 789. 790. 791. 792. 793. 794. 795. 796. 797. 798. 799. 800. 801. 802. 803. 804. 805. 806. 807. 808. 809. 810. 811. 812. 813. 814. 815. 816. 817. 818. 819. 820. 821. 822. 823. 824. 825. 826. 827. 828. 829. 830. 831. 832. 833. 834. 835. 836. 837. 838. 839. 840. 841. 842. 843. 844. 845. 846. 847. 848. 849. 850. 851. 852. 853. 854. 855. 856. 857. 858. 859. 860. 861. 862. 863. 864. 865. 866. 867. 868. 869. 870. 871. 872. 873. 874. 875. 876. 877. 878. 879. 880. 881. 882. 883. 884. 885. 886. 887. 888. 889. 890. 891. 892. 893. 894. 895. 896. 897. 898. 899. 900. 901. 902. 903. 904. 905. 906. 907. 908. 909. 910. 911. 912. 913. 914. 915. 916. 917. 918. 919. 920. 921. 922. 923. 924. 925. 926. 927. 928. 929. 930. 931. 932. 933. 934. 935. 936. 937. 938. 939. 940. 941. 942. 943. 944. 945. 946. 947. 948. 949. 950. 951. 952. 953. 954. 955. 956. 957. 958. 959. 960. 961. 962. 963. 964. 965. 966. 967. 968. 969. 970. 971. 972. 973. 974. 975. 976. 977. 978. 979. 980. 981. 982. 983. 984. 985. 986. 987. 988. 989. 990. 991. 992. 993. 994. 995. 996. 997. 998. 999. 1000.



ands). 4. Mexican Woman (Yucatan). 5. Indian (Ecuador). 6. Indians (Peru). 7. Ipurina (Brazil). 8. Sioux.
 raja. 18. Botokudin, 19. Umaua or Omagua (Brazil). 20. Araucanian (Chile). 21, 22. Woman and Child of Terra

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11-112
1-11-11, of 11-11-11

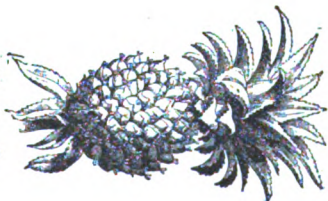
Mayapple.



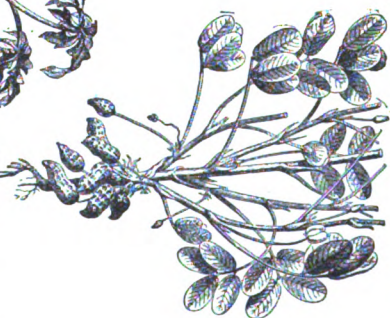
Sweet potato.



Pineapple.



Peanut.



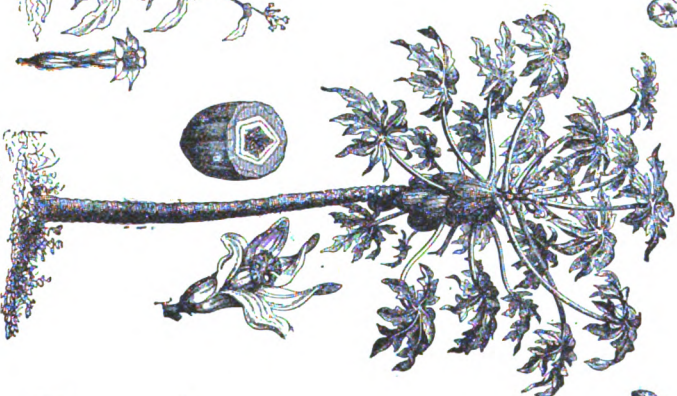
Castor-oil plant.



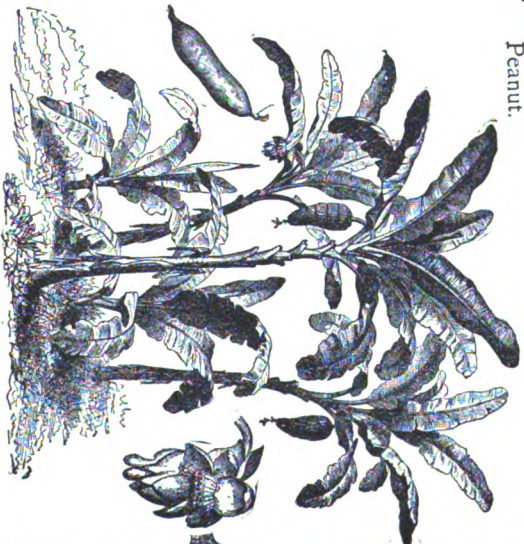
Tobacco.



Melon tree.



Banana.





RELIEF MAP OF NORTH AMERICA.

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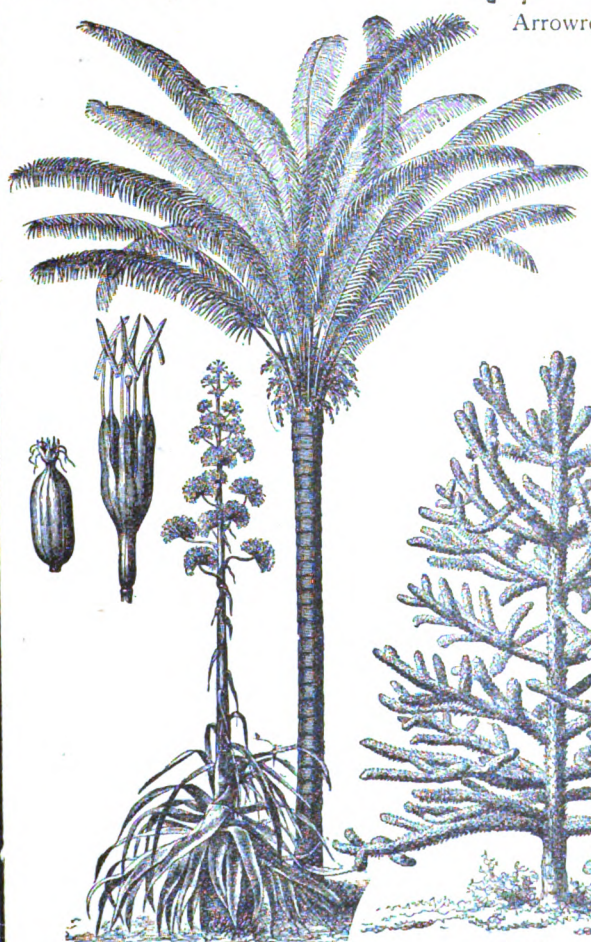
Vanilla plant.

Arrowroot.

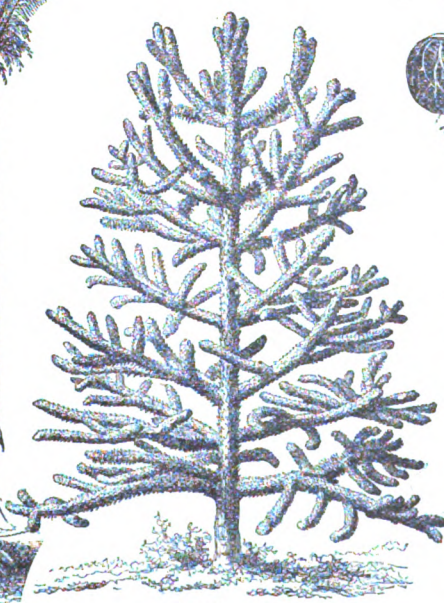
Jalap.



Paraguay tea.



Century plant. Coquilla palm.



Chili palm.



Cornahuba palm.

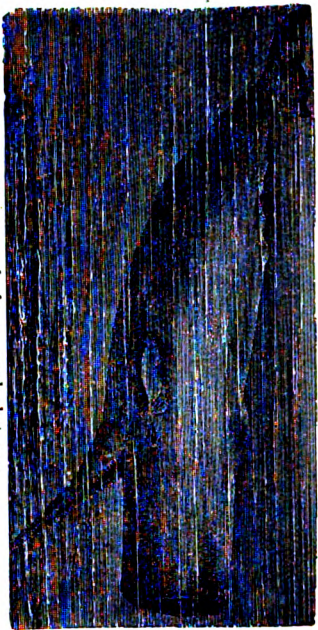
Mississippi River system is, next to the Amazon, the largest in the world. It receives as tributaries the Missouri, the Ohio, the Arkansas, and the Red River, draining a total territory of about one million and a half sq. mi. This river system is separated from the Mackenzie River system by a low plateau which stretches across the country near the Canadian lakes. The Mackenzie flows into the Arctic Ocean. A part of this territory north of the lakes is drained by numerous small rivers which empty into Hudson Bay. The third great river system is the St. Lawrence, which is the outlet of the five great lakes. It has a drainage area of about 400,000 sq. mi. The Rio del Norte flows into the Gulf of Mexico, draining an area of about 200,000 sq. mi. The principal rivers emptying into the Pacific Ocean are the Columbia, the Colorado, the Sacramento, and the Frazer. The Yukon, in Alaska, empties into Bering Sea. The principal indentations of the coast of North America are Hudson Bay, the Gulf of St. Lawrence, the Gulf of Mexico, Long Island Sound, the bays of Fundy, Cape Cod, Delaware, and Chesapeake, and the Gulf of California and San Francisco Bay and Puget Sound.

Geology.—If we run a line westward across the continent of North America at the latitude of Delaware Bay (38°), the geological formations present themselves in the following order: 1. Tertiary and Cretaceous strata on the shores of the Atlantic; 2. Gneiss underlying these strata, and presenting itself on the eastern slope of the Alleghany or Appalachian mountains, but covered in parts by new Red Sandstone; 3. Palæozoic rocks, consisting of Silurian, Devonian, and Carboniferous strata, curiously bent into parallel foldings, with syndinal and articial axes, the crests of the latter forming the ridges of the Alleghany Mountains, which in this region rise to the height of 2,500 feet. Upon these Palæozoic rocks rest three great coal-fields—the Appalachian, that of Illinois, and that of Michigan, covering a large portion of the space between the Alleghanies and the Mississippi, and embracing collectively an area equal to the surface of Great Britain. From the Mississippi westward to Utah the Palæozoic rocks occur in great folds, between which are extensive areas of Triassic, Oolitic, Cretaceous, and Tertiary beds. In California the rocks are chiefly metamorphosed secondary strata on which lie patches of Tertiary sediments. In British America there is an enormous development of the Laurentian and Huronian rocks, which are the oldest yet discovered, and occupy most of the country immediately north of the large lakes. Newfoundland and the neighboring British territories consist of Pre-Silurian, Silurian, Devonian, Carboniferous (which includes coal-fields of considerable extent), and Triassic rocks. The area north of about 40° n. is also covered and strewn with glacial drift and boulders.

The Ozark Mountains resemble the Alleghanies in their mineral structure, containing the

same rocks from the granite to the carboniferous, and probably upward to the chalk. The mineral products of N. A. are of unequalled richness and variety. Gold is abundant in California, Nevada, and Montana. It is also found in British Columbia, Mexico, Alaska, and Canada, and sparingly in Virginia and South Carolina. Silver is obtained from Mexico, California, and Newfoundland. Great masses of almost pure copper are found in the Huronian rock strata, the north and east shores of Lake Superior being the richest of copper mining regions; while New York and Indiana possess a share of the same metal, and it is found in different countries from British Columbia to the isthmus. The iron ores of Pennsylvania, and those of Canada, including New Brunswick, are of the greatest importance; the former are rendered more available by their occurring close to the beds of bituminous coal, giving materials for the manufacturing industry of Pittsburgh; while anthracite coal is obtained from the eastern districts of Pennsylvania. It is estimated that one third of the total area of this state is occupied by coal-fields, which can scarcely be exhausted. Lead is found in Wisconsin, Illinois, and Missouri, in New York, in Canada, in California; white zinc is got from Arkansas and New Jersey. Reverting to the subject of coal, as having an intimate economic connection with all metallic wealth, it should be observed that the united area of all the coal-fields in the U. S. is estimated at 190,000 sq. mi., exceeding twenty-fold those of Europe. The chief of these coal-fields are, first, the Appalachian, extending from the Susquehanna in Pennsylvania to the Tuscaloosa in Alabama, along the west side of the Alleghany Mountains; the area of this coal-field is 70,000 sq. m., and its greatest thickness 2,500 feet; secondly, the coal-field of Michigan, about the center of that state; thirdly, the extensive coal-field between the Ohio and the Mississippi, across the states of Indiana and Illinois; lastly, the Iowa and Missouri coal-field. Coal is found also in Nova Scotia, in British Columbia, and Vancouver Island, and wherever the Upper Palæozoic strata prevail in the geological structure.

Climate.—The climate of N. A. varies from the tropical to the frigid. Mexico is hot, moist, and unhealthy on the low coast, but the greater part of its area, comprising all the populous district, is a table-land from 5,000 to 9,000 feet in height. In consequence of this, Mexico, though half of it is within the torrid zone, has a temperate and equable climate. The mean heat of the capital (7,400 feet above the sea) is $62\frac{1}{2}^{\circ}$. The difference between the warmest and the coldest month is only 12° . In the extensive region lying between the parallels of 30° and 50° n., which comprehends three fourths of the useful soil of N. A., we have three well-marked varieties of climate, that of the east coast, the west coast, and the basin of the Mississippi. On the east coast, from Georgia to Lower Canada, the range of the thermometer is very great, the summer



Sperm whale or cachalot (1-189).



Narwhal (1-90).



Beaver (1-95).



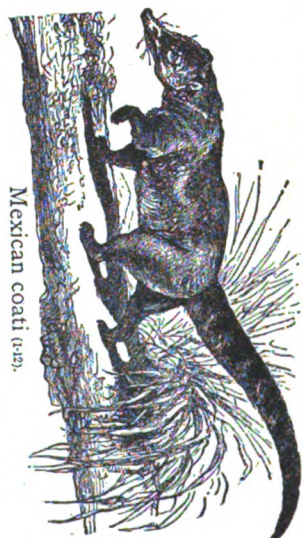
Opossum (1-8).



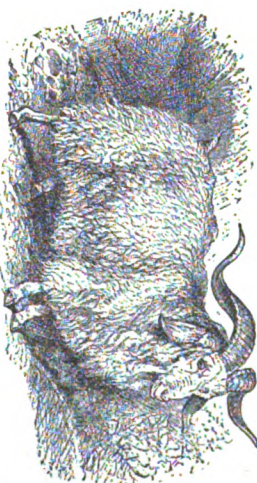
Guinea pigs (1-6).



Polar bear (1-45).



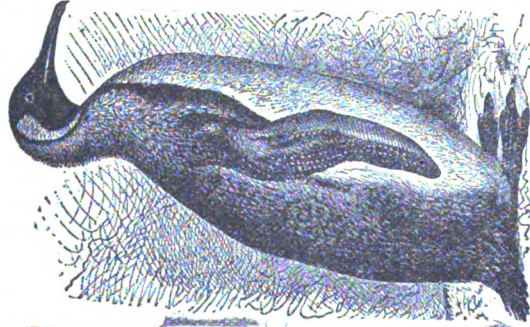
Mexican coati (1-12).



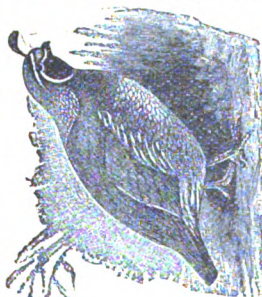
Angora goat (1-7).



Raccoon (1-98).



Penguin (14).



California Quail (16).



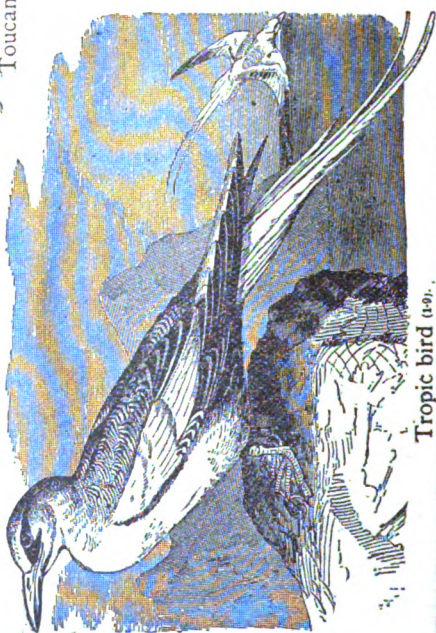
Kingbird (13).



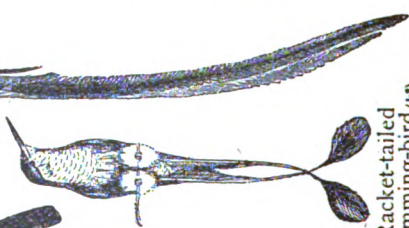
Quetzal (15).



Toucan (14).



Tropic bird (14).



Racket-tailed humming-bird (14).



Rhea (American ostrich) (130).



Mother Carey's Chickens (14).

being hot and the winter cold. At Quebec the temperature of the warmest month exceeds that of the coldest by no less than $60\frac{1}{2}^{\circ}$ F. The climate undergoes a more rapid change in America as we proceed from south to north, a degree of latitude in the middle of the temperate zone producing a decrease of annual temperature of $1^{\circ}.57$ F. At the mouth of Columbia River, in latitude $46\frac{1}{2}^{\circ}$ n., the mean heat of the warmest month was about 62° F., of the coldest about 36° , and of the whole year 51° . The place is under the same latitude with Quebec, where the snow lies five months, and the mean temperature during the three winter months is 18° below the freezing point. This single circumstance marks emphatically the contrast in the climate of the east and west coasts of N. A.

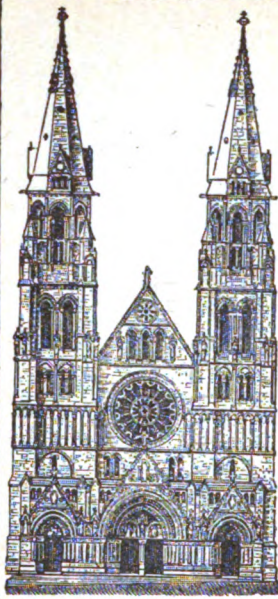
Vegetation.—North America is rich in forests of pine, oak, ash, hickory, beech, walnut, maple, cedar, cypress, juniper, hemlock, basswood, palmetto, dogwood, willow, elm, sycamore, magnolia, gum, locust, and other trees. Perhaps the most important plant is the maize or Indian corn. Corn is raised mostly in the central part of the U. S., and is the principal product of many of the prairie states. Wheat, barley, peas, oats, and rice are cultivated throughout the greater portion of the continent. Vanilla, pimento, jalap, cinchona, tobacco, sweet potatoes, and the cactus are grown in various parts, and are mostly indigenous. All kinds of vegetables and fruits are grown. The orange, lemon, apple, peach, and pear are grown very extensively. Coffee, sugar, and cotton are staple products. The potato is a native of both North and South America and is raised in great quantity.

Zoology.—The animals of N. A. include the polar, black, and grizzly bears in the Arctic regions and Rocky Mountains. Also the cougar, or panther, lynx, and wildcat. Formerly the buffalo, or bison, roamed over the prairies in great herds but it is now almost extinct. Other animals are the musk-ox, the moose, reindeer, antelope, wolves, dogs, and foxes. Among the smaller animals are beaver, otter, raccoon, badger, opossum, weasel, hare, muskrat, squirrel, porcupine, gopher. There are numerous species of reptiles, the rattlesnake being among the most dangerous. In the southern part of the U. S. and in Mexico are found the alligator, boa-constrictor, tortoise, sea-turtle, toad, frog, and lizard. There are a great many birds found which are peculiar to this continent. The wild turkey, one of the principal native birds, has now almost disappeared. Wild pigeons are still found in some localities. Other birds are the bald eagle, sparrow-hawk, swallow-tail hawk, falcon, vulture, turkey-buzzard, and owl. Among the smaller birds are turkeys, pheasants, grouse, and quails; also cranes, herons, flamingoes, spoonbills, rails, and gallinules. The principal water fowls are swans, wild geese, ducks, and pelicans. Some of the smaller birds are larks, orioles, buntings, magpies, jays, cedar birds, thrushes, shrikes, mocking birds, robins, grossbeaks, bluebirds, parrots,

woodpeckers, humming-birds, kingfishers, whip-poor-wills. The principal varieties of fish are sturgeon, salmon-trout, shad, white fish, mackerel, herring, halibut, sheeps-head, salmon, bass, perch, pike, blue fish, suckers. The domestic animals are horses, cattle, sheep, and swine.

Population.—The inhabitants of N. A., when it was discovered by Europeans, were Indians of whom many are still in existence, though they are fast disappearing before the advance of civilization. Whence came the aborigines of America no one can say definitely, but the best authorities agree that they came from Asia. The Indians living in N. A. at the present time are, in the extreme northern parts, the Esquimaux; a few in the U. S., located in the Indian Territory, and some on small reservations in various states, and in Mexico. When the Europeans first came to this continent the various tribes of Indians were scattered over the whole continent. Some of the Indians had made great advances in a rude sort of civilization, dwelling in large and well-built houses and having a settled form of government, practising agriculture and to some extent the mechanical arts. The white population of the continent is mainly of British origin though to considerable extent it consists of Germans, Scandinavians, and the descendants of such. There may also be found representatives of nearly every race and nation on the face of the globe. The African race constitutes an important part of the population especially in the southern part. It consists of freed slaves and the descendants of slaves.

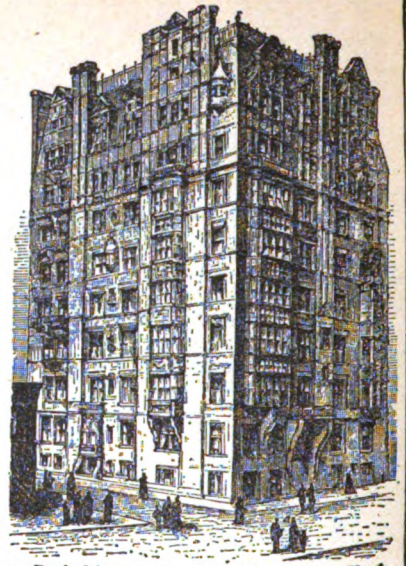
History.—America was first made known to the world by the discovery of Christopher Columbus who set sail from Spain in August, 1492. The continent of North America was first discovered by John Cabot and his son Sebastian, in 1497. The new world was named after Amerigo Vespucci who was the first to write a description of it. Various voyages were made from Europe, the principal ones being by Gaspar de Cortereal, a Portuguese sailor, who made two voyages to the coast of Labrador; Ponce de Leon, who discovered Florida in 1512; Verrazzano, a Florentine sailor, who explored more than 2,000 miles of the eastern coast; Jacques Cartier, who explored Newfoundland and descended the St. Lawrence; Cortez, who discovered and conquered Mexico. The first English settlers in what is now the U. S. came in 1607, locating in Jamestown, Va. From time to time colonies came from England, Holland, and France and made settlements along the eastern coast, from Florida to Quebec. At times expeditions were made inland, and in the course of 150 years settlements were made on the Great Lakes and in the Mississippi Valley. By 1776 the English owned most all of the settlements except those of Quebec and Florida. In that year the English colonies established an independent American Commonwealth. In 1821 Mexico became independent of Spain, forming a republic. The remainder of N. A.,



1. All Saints Cathedral at Albany.



2. Statue of Lincoln at Chicago (St. Gaudens).



3. Berkshire Apartment House at New York.



4. Villa at Newport, Rhode Island.



5. Mourning Jerusalem (Story).

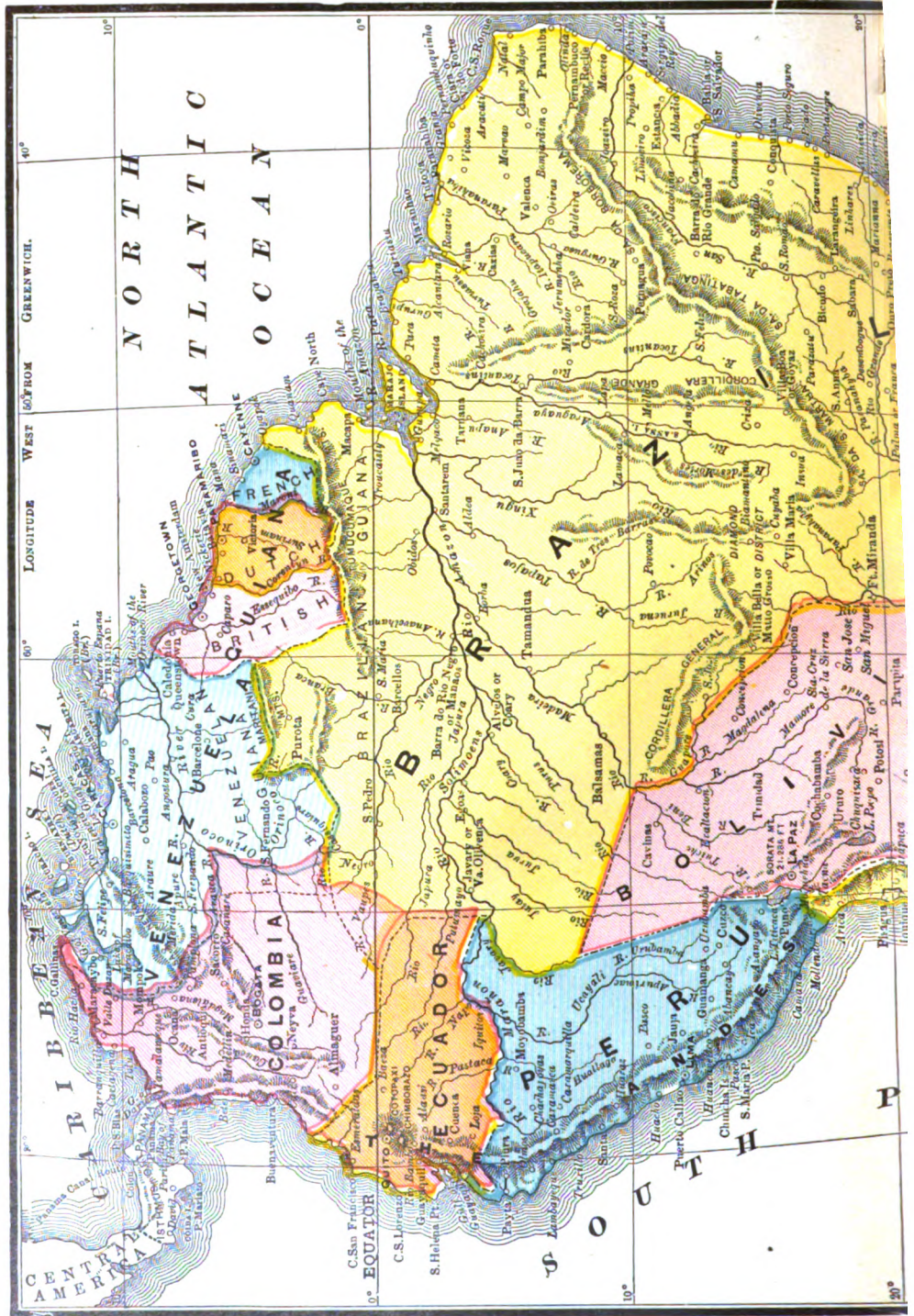


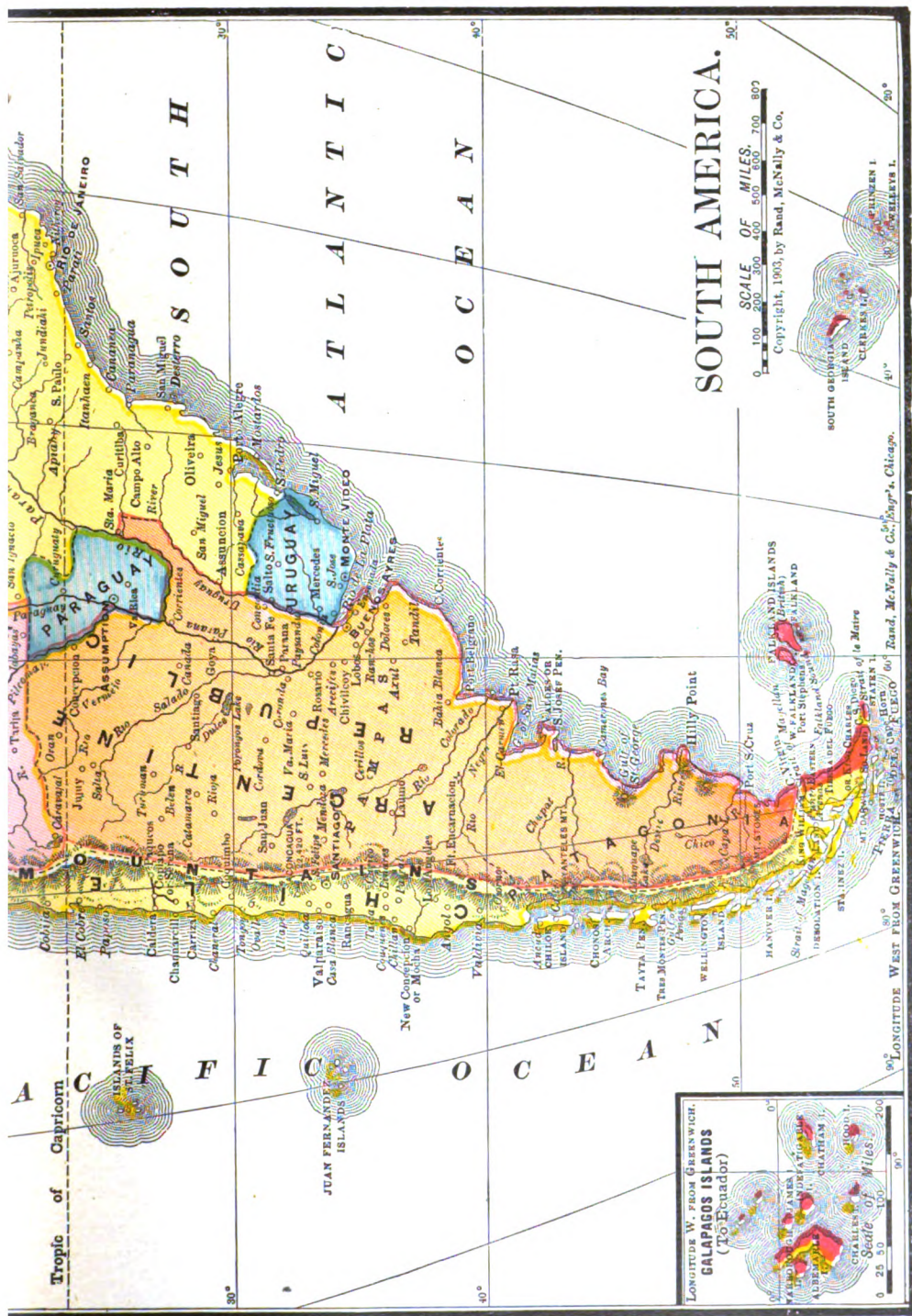
6. Sophocles (Donoghue).



7. National Capitol at Washington.

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RELIEF MAP OF SOUTH AMERICA.

except the peninsula of Alaska, which belongs to the U. S., and Greenland, which is a Danish possession, belongs to Great Britain.

CENTRAL AMERICA extends from the Isthmus of Panama to the Isthmus of Tehuantepec. Its entire length is about 800 mi., with a breadth varying from 25 to 350 mi. Its area is about 190,000 sq. mi. The political divisions of Central America are Guatemala, Honduras, San Salvador, Nicaragua, Costa Rica, and British Honduras.

Surface, Rivers, and Lakes.—The surface of Central America is for the most part mountainous. North of Panama is the plateau of Veragua, the highest point of which is 8,000 ft. The plateaus of Costa Rica and Cartago lie north of this. There are several peaks of 10,000 ft. in height. These plateaus gradually slope down to the plain of Nicaragua, north of which rises the table-land of Honduras with an average height of 4,000 ft. South of this region are two rows of volcanoes. The plateaus of Honduras and Guatemala are connected by a single mountain. In the plateau of Guatemala are several volcanoes over 12,000 ft. in height. Among the rivers of Central America which are considerable in size though short, are the Usumasinta and the San Juan, the outlet of Lake Nicaragua. On the east coast is the Gulf of Honduras, and on the west the Bay of Panama, the Gulf of Dulce, Coronada Bay, Gulf of Nicoya, and the Gulf of Fonseca. The lakes are: Nicaragua, area 34,000 sq. mi., Managua in Nicaragua, Illopongo, Amatitlan, and the Yojoa.

Geology.—In the central part are the crystalline and volcanic rocks, on either side of which are strata of the Tertiary Age. Gold, silver, lead, and mercury are found in many places and especially in Costa Rica and Honduras. The only hindrance to the working of these mines is the unhealthy climate. Jasper and marble are also found in Honduras and large quantities of salt are produced on the western coast, and also from the numerous salt springs.

Climate.—There are only two seasons in Central America, the wet and the dry. During the wet season the skies are filled with clouds and falling rain and the sun is seldom seen. During the dry season the temperature does not rise so high, but hot and dry weather prevails, and the atmosphere is clear and healthy. The higher regions are more open and are comparatively healthy, but many contagious diseases prevail in the low marshes.

Vegetation.—Central America is rich in the growth of vegetables and tropical fruits, among which are sugar-cane, indigo, Indian corn, sweet potatoes, tobacco, cacao, the cactus, mandioca, and banana. There are large forests of mahogany, logwood, lignum-vitæ, pimento, sarsaparilla, vanilla, black balsam, etc. There are about one hundred different kinds of trees in the forests of Panama that are fatal to animal life.

Zoology.—There is very little difference between the zoology of C. A. and the other divisions of the continent. There are many

species of humming-birds and quetzal. The birds are noted for their brilliant plumage. There are many large and dangerous serpents, also a brown and green species of locust. The rivers and lakes are rich in fish.

Population.—The inhabitants of C. A. are the descendants of the Spaniards who settled there centuries ago, and some Indians and creoles. There are also a few blacks. In general the people of these hot republics are quarrelsome.

History.—Columbus visited the east coast of C. A. in 1502, passing along the shores of Honduras and Costa Rica. In 1523 Cortez sent one of his lieutenants to conquer this region which he did in two years' time. The whole territory belonged to Spain from that time until 1823 when it became a republic. In 1833 this republic was dissolved and the five extant republics were formed. The only European possession is that of British Honduras owned by Great Britain.

SOUTH AMERICA is a vast peninsula of a roughly triangular form about 5,000 mi. long by 3,230 mi. broad, having an area of about 7,000,000 sq. mi. The political divisions of S. A. are Brazil, Venezuela, Colombia, Ecuador, Peru, Bolivia, Chile, the Argentine Republic, Paraguay, Uruguay, and British, Dutch, and French Guiana.

Surface, Rivers, and Lakes.—There are four great systems of mountains in S. A., the greatest of which are the Andes, on the Pacific coast, stretching in a continuous chain for over four thousand miles. Next to the Himalayas this is the highest mountain range in the world, the highest point being 25,000 feet. The second system is that of the highlands of Guiana which lie north of the Amazon valley. Here are several irregular groups of mountains about 2,000 feet high which separate the plains of the Orinoco from those of the Rio Negro and the Amazon. The third system is the coast chain of Venezuela, the highest point of which is 8,600 feet. The Brazilian highland, the fourth system, is very broad, and crossed by low ranges of mountains. Its average height is less than half that of the Andes. From the configuration of its surface, the continent may be divided into five physical regions: 1. The low country skirting the shores of the Pacific Ocean, from 50 to 150 mi. in breadth, and 4,000 in length. The two extremities of this territory are fertile, the middle a sandy desert. 2. The basin of the Orinoco, a country consisting of extensive plains, or *steppes*, called Llanos, either destitute of wood or merely dotted with trees, but covered with a very tall herbage during a part of the year. During the dry season the heat is intense here, and the parched soil opens into long fissures, in which lizards and serpents lie in a state of torpor. 3. The basin of the Amazon, a vast plain, embracing a surface of more than two million square miles, possessing a rich soil and humid climate. It is covered almost everywhere with dense forests, which harbor innumerable tribes of wild animals, and are thinly inhabited by savages,



Cacao (Chocolate).



Sarsaparilla.



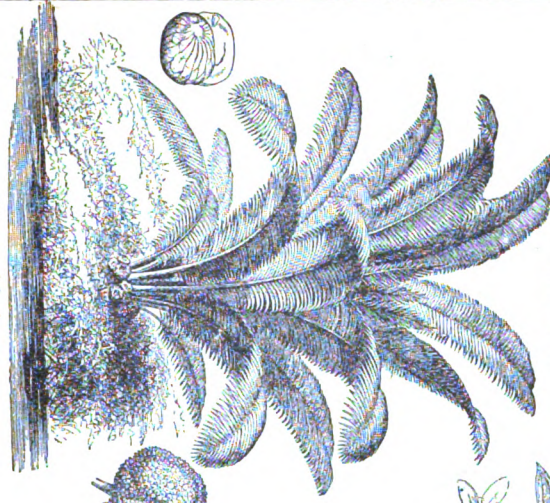
Copal.



Logwood.



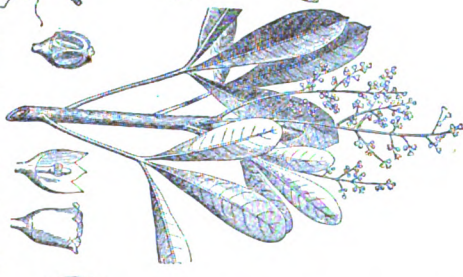
Yam.



Vegetable ivory.



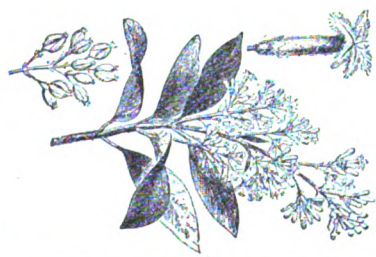
Ipecac.



Caoutchouc (India rubber).



Coca.



Cinchona (Quinine).

who live by hunting and fishing. 4. The great southern plain, watered by the Plata and the numerous streams descending from the eastern summits of the Cordilleras. Open *steppes*, which are here called Pampas, occupy the greater portion of this region, which is dry, and in some parts barren, but in general is covered with a strong growth of weeds and tall grass, which feeds prodigious herds of horses and cattle, and affords shelter to a few wild animals. 5. The country of Brazil, eastward of the Paraná and Uruguay, presenting alternate ridges and valleys, thickly covered with wood on the side next the Atlantic, and opening into *steppes*, or pastures, in the interior.

The three important river systems of S. A. are the Amazon, the Orinoco, and the La Plata, the Amazon being the largest river on the globe. All of these rivers flow into the Atlantic. The Amazon rises in the Andes, and is 4,000 mi. long. It is navigable for about 2,300 mi. The Orinoco rises in the Paríne mountains and is 1,400 mi. long. The Orinoco and the Amazon systems are connected by a small river called the Cassiquiare. The Plata is formed by the confluence of the Panana and Uruguay rivers and is 185 mi. long, and at its mouth about 125 mi. wide. The principal smaller rivers are the San Francisco, the Rio Negro, the Colorado and Essequibo. The largest lake is Titicaca in the Andes, covering an area of about 4,000 sq. mi. and is over 12,000 feet above the level of the sea. There are several small lakes in the mountain regions but none of any special importance.

Geology.—The mountain areas of S. A. are as a general rule, those which have received the thickest accumulations of sedimentary matter. During the periods of the formation of such deposits, these areas were areas of subsistence, and since those beds which once formed the sea bottoms now constitute the highest peaks, these areas must have been subjected to subsequent upheaval. Vertical movements of this kind have occurred again and again, indicating that these areas are specially liable to disturbance. The history of the mountain chains is almost co-extensive with that of the continent itself. In the sea the beds were deposited horizontally, or nearly so; and at certain intervals the beds were uplifted above the sea. The rocks were at one time faulted, folded, and metamorphosed, and at other times denuded. The land was uplifted in a broad band, the axis of which ran parallel to the shore of the sea in which the beds were formed. The principal ridges formed during the same period usually coincide in direction with the stratigraphical strike of the bed forming them. The oldest rocks form the outermost rim of the continent, of which the n.e. and s.e. corners have probably been swept away. These corners now correspond with the mouths of the Orinoco, the Amazon, and the La Plata rivers. Within this basin are schists and quartzites, which are in all probability of Silurian age. Within

this again are sandstones and limestones, usually referred to the Carboniferous period, which also form part of the transverse ridges. A band of rocks of secondary age follow, some of which are believed to be Triassic, while others are identified as Cretaceous. Tertiary beds, some of Miocene date, together with Post-Tertiary beds, cover the largest part of the areas of the great river basins and the hollows in the mountain range, and also occur on the seaward flanks of the principal chains. There are some twenty or more volcanic cones, of which about a dozen are active. Bolivia has one or two active vents, and Peru several; but it is in Ecuador, with its dozen ignivomous vents, that have occurred the grandest and most frequent displays. Colombia has four or five volcanoes. With the exception of the Moluccas, no country in the world has had so many and so destructive earthquake shocks as S. A. But these are concentrated along the Andes, and more particularly their western slope. Comparatively few are felt in the plains to the east of them. Peru seems to be the principal focus of action; and next to it in importance as a seismic area comes Chile. Bolivia is comparatively free from them, as also are Brazil and the Argentine Republic, but they are more frequent in Ecuador, Colombia, Venezuela, and the three Guianas.

The mineral wealth of S. A. consists in gold, silver, copper, mercury, diamonds, and other valuable metals. The desert coast of Chile is rich in guano, niter, valuable iodine compounds, and borax. Chile is also rich in copper and silver and the coal mines are being developed rapidly and give promise of great wealth. There are celebrated silver mines in Bolivia and considerable supplies of gold in Venezuela and Guiana. Some rich gold mines have been discovered in the southern part of Argentine. Brazil has some coal mines, but its great mineral wealth consists in diamonds.

Climate.—In the western and warmest part of the parched *steppes* of Caraccas, the hottest known region in America, the temperature of the air during the day is only 98° in the shade. At Calabozo, farther east in the Llanos, the common temperature of the day is only from 88° to 90°; and at sunrise the thermometer sinks to 80°. The basin of the Amazon is shaded with lofty woods; and a cool breeze from the east, a minor branch of the trade-wind, ascends the channel of the stream, following all its windings, almost to the foot of the Andes. Hence this region, though under the equator, and visited with almost constant rains, is neither excessively hot nor unhealthy. Brazil, and the vast country extending westward from it between the Plata and the Amazon, is an uneven table-land, blessed with an equable climate. At Rio Janeiro, which stands low, and is exposed to a heat comparatively great, the temperature in summer varies from 68° to 82° F., and the mean is only about 74°. Farther north, and in the interior, the Indians find it necessary to keep fires in their huts; and in the country



Amazon Parrot

Macaw

Iguana



Furrowed Tortoise



Hooded Basilisk
(*Basiliscus mitratus*).



Capybara

Boatbill

Jabiru

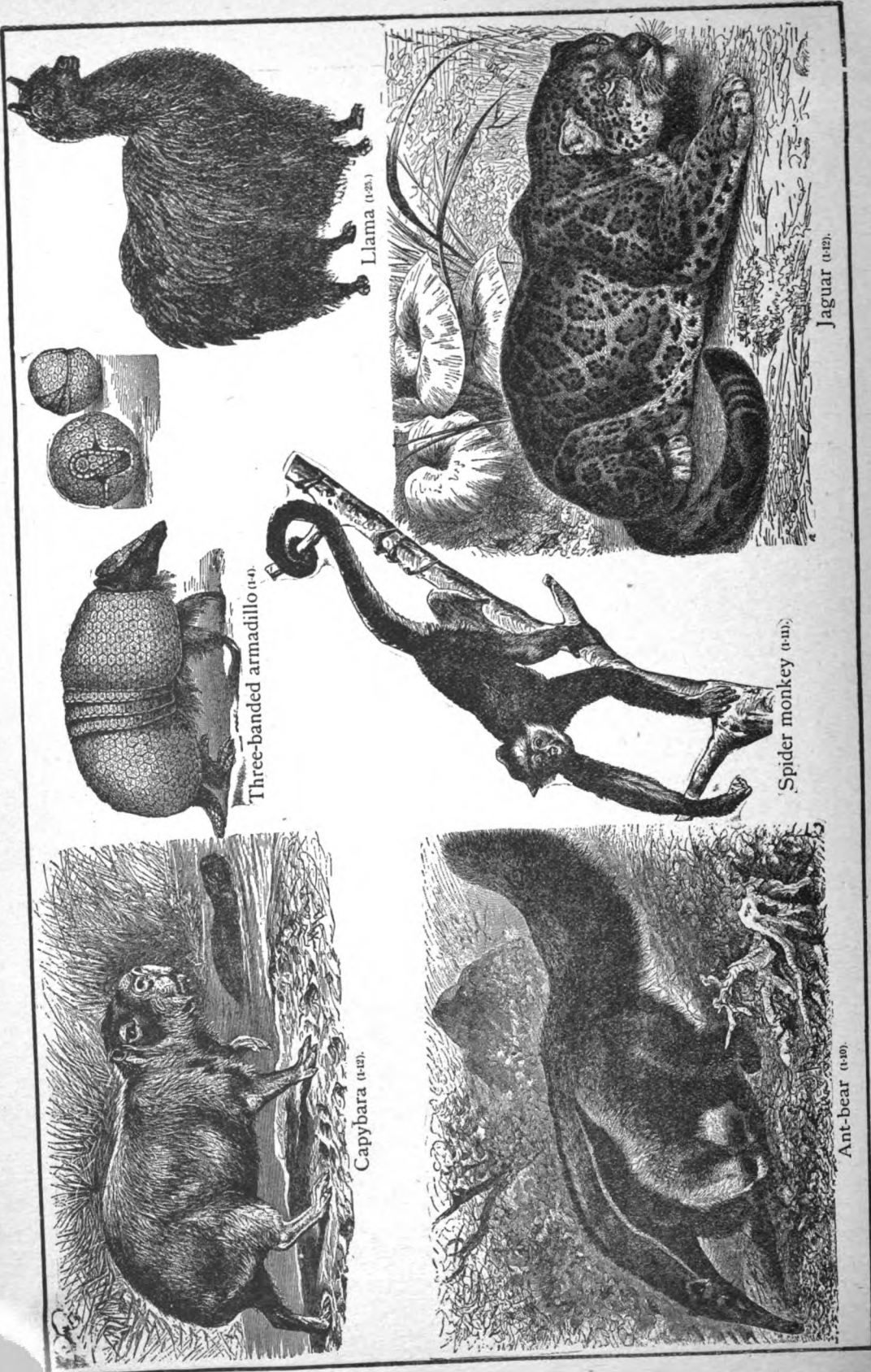
Manatee



Horned Screamer

Jaguar

Tapir



Jaguar (112).

Llama (123).

Spider monkey (111).

Three-banded armadillo (114).

Capybara (113).

Ant-bear (110).

America

near the sources of the Paraguay, hoar-frost is seen on the hills during the colder months, and the mean temperature of the year falls below 65° or 67°. On the declivities of the Andes, and on the high plains of Upper Peru, the heats are so moderate that the plants of Italy, France, and Germany come to maturity. Lower Peru, though a sandy desert, enjoys a wonderful degree of coolness, owing to the fogs which intercept the solar rays. At Lima, which is 540 feet above the sea, the temperature varies from 53° to 82°, but the mean for the whole year is only 72°. At Buenos Ayres, for instance, the mean annual heat is 68° F. As we advance southward, the diminishing breadth of the continent makes the climate approximate to that of an island, and the extremes approach each other. In the Strait of Magellan the temperature of the warmest month does not exceed 43° or 46°; and snow falls almost daily in the middle of winter. The climate of Patagonia is absolutely colder than that of places in the same latitude in Europe; but the difference lies chiefly in the very low temperature of the summer. This peculiarity no doubt results chiefly from the greater coolness of the sea in the southern hemisphere; for beyond the parallel of 48°, the difference of temperature in the north and south Atlantic amounts, according to Humboldt, to 10° or 12° of Fahrenheit's scale. The sum of the peculiar qualities which distinguish the climate of South America may be briefly stated. Near the equator the new continent is humid; and within the tropics generally, owing to its vast forests, the absence of sandy deserts, and the elevation of the soil, it is cooler. Beyond the tropics the heat is nearly the same in the south temperate zone of America and the northern one of the old continent, till we ascend to the latitude of Cape Horn, where we have cold summers and a very limited range of the thermometer.

Vegetation.—The vegetable kingdom in S. A. has a magnificent development, particularly in the vast tropical territory east of the Andes, the basins of the Amazon, the Orinoco, and their tributaries, where the genera and species are very abundant, the forests large, and the forms gigantic. Besides its palms, it has dyewoods of all sorts, cedar, mahogany, ebony, etc.; farther south are the araucarias of Chile, and the beech forests of Argentine. There are numerous kinds of fruit trees, the fruit of which is usually very large, and covered with an extremely thick shell. Among these may be mentioned the cannon-ball tree and the Brazil-nut tree. Ferns and water lilies are also numerous represented, and splendid specimens of both are found. The jungle, or undergrowth, in the forests, is impenetrable in many places. Cinchona is found on the higher ground within the tropics. A holly is grown, the leaves of which are soaked in water, and produce a beverage called "Paraguay Tea."

Zoology.—The zoology of S. A. is extensive and peculiar, embracing a fourth of all the

America

known mammals, among which, however, are almost none of the wild animals so abundant in Africa and Asia. The most powerful of the carnivora is the jaguar, which is indeed the only formidable beast of prey in the whole continent. Of the other animals may be mentioned the great tapir, peccaries, sloths, anteaters, armadillos; the llama, the chinchilla, and the monkey. The armadillo is said to be the only wild animal that increases with the increase of population. It catches mice and poisonous snakes, kills them, cuts them up, and eats as much as it requires. Although often hunted for its succulent flesh, by means of trained dogs, this singular animal actually multiplies in number as the population of the district it inhabits increases. If versatility in habits or adaptiveness can be taken as a measure of intelligence, the armadillo is the superior of the large-brained cats and canines. Many of the species are peculiar to S. A., and are not found elsewhere. Among birds the most notable are various parrots, humming-birds, flamingoes, toucans, and aracaris. Chief among the reptiles are alligators, boas, turtles, and rattlesnakes.

Population.—The aborigines of S. A. are undoubtedly of the same race as those of N. A., as there exists a very striking general physical resemblance between the native races throughout the whole of the American continent, from Cape Horn to Bering's Strait. See *America and Indians*. They are almost all of a copper color, with long black hair, deep-set black eyes, aquiline nose, and often handsome, slender form. In S. A. these red men are far more numerous than in N. A., and though many are half-civilized, a greater number are in a state of barbarism. A considerable portion of the population also consists of persons of Spanish and Portuguese blood, and along with these a far greater number of mixed Indian and European blood, civilized, and forming an important element in the various states of the continent. To these are now being added considerable numbers of Spanish and Italian immigrants.

History.—Columbus first touched the continent at the mouth of the Orinoco in 1498. The next navigator to explore this continent was Hojeda, a Spaniard, who touched the continent near the equator and passed up the coast of Venezuela. He was accompanied by Amerigo Vespucci. Vespucci was an experienced mariner, and in 1500, after his return, published an account of the voyage, and on account of this the new world was called America. Spain and Portugal had almost entire control of the continent until the beginning of the nineteenth century. The Spanish colonies declared their independence in 1810 and after a ten years' war established a number of republics. In 1823 Brazil became independent of Portugal and retained a monarchical form of government which lasted until 1889, when the form of government was changed to a republic. The only foreign possessions on the continent at the present time are those of British, French and Dutch Guiana.

American Federation

Between the first of these and Venezuela there was a boundary dispute which was submitted to arbitration. The U. S. Government requested this under the authority of the "Monroe Doctrine." See *Venezuela*.

American Federation of Catholic Societies.

The American Federation of Catholic Societies has for its objects "the cementing of the bonds of federal union among the Catholic laity and the Catholic societies of the United States; the fostering and protecting of Catholic interests and works of religion, piety, education and charity; the study of social conditions and the encouragement of the spread of Catholic literature and of the circulation of the Catholic press." The headquarters of the federation are at 612 East Pearl Street, Cincinnati, Ohio.

Americanism, a term applied to certain words and idioms of the English language peculiar to the U. S. Following are a few of the more common Americanisms:

Around or round, about or near. To *hang around* is to loiter about a place.

Backwoods, the partially cleared forest regions in the western states.

Bogus, false, counterfeit.

Boss, an employer or superintendent of laborers, a leader.

Bug, a coleopterous insect, or what in England is called a *beetle*.

Buggy, a four-wheeled vehicle.

Bulldoze, to; to intimidate voters.

Bunkum or *buncombe*, a speech made solely to please a constituency; talk for talking's sake, and in an inflated style.

Bureau, a chest of drawers; a dressing-table surmounted by a mirror.

Calculate, to suppose, to believe, to think.

Canebrake, a thicket of canes.

Caucus, a private meeting of the leading politicians of a party to agree upon the plans to be pursued in an approaching election.

Chunk, a short, thick piece of wood or any other material.

Clever, good-natured, obliging.

Corn-husking, or *corn-shucking*, an occasion on which a farmer invites his neighbors to assist him in stripping the husks from his Indian corn.

Cowhide, a whip made of twisted strips of rawhide.

Creek, a small river or brook; not, as in England, a small arm of the sea.

Cunning, small and pretty, nice; as, it was such a *cunning* baby.

Dead-heads, people who have free admission to entertainments, or who have the use of public conveyances, or the like, free of charge.

Dépôt, a railway station.

Down east, in or into the New England states. A *down-easter* is a New Englander.

Drummer, a commercial traveler.

Dry goods, a general term for such articles as are sold by linen-draperies, haberdashers, hosiers, etc.

Fix, to; to put in order, to prepare, to adjust. To *fix* the hair, the table, the fire, is to dress the hair, lay the table, make up the fire.

Fixings, arrangements, dress, embellish-

Americanism

ments, luggage, furniture, garnishings of any kind.

Gerrymander, to arrange political divisions so that in an election one party may obtain an advantage over its opponent, even though the latter may possess a majority of votes in the state; from the deviser of such a scheme, named *Gerry*, governor of Massachusetts.

Given name, a Christian name.

Grit, courage, spirit, mettle.

Guess, to; to believe, to suppose, to think, to fancy; also used emphatically, as "Joe, will you liquor up?" "I guess I will."

Gulch, a deep, abrupt ravine, caused by the action of water.

Happen in, to; to happen to come in, or call.

Help, a servant.

Highfalutin, inflated speech, bombast.

Hoe-cake, a cake of Indian meal baked on a hoe or before the fire.

Johnny-cake, a cake made of Indian corn meal mixed with milk or water, and sometimes a little stewed pumpkin; the term is also applied to a New Englander.

Julep, a drink composed of brandy or whisky with sugar, pounded ice, and some sprigs of mint.

Loafer, a lounge, a vagabond.

Log-rolling, the assembly of several parties of wood-cutters to help one of them in rolling their logs to the river after they are felled and trimmed; also employed in politics to signify a like system of mutual co-operation.

Lot, a piece or division of land, an allotment.

Lumber, timber sawed for use; as beams, joists, planks.

Lynch law, an irregular species of justice executed by the populace or a mob, without legal authority or trial.

Mail letters, to; to post letters.

Mitten: to *get the mitten* is to meet with a refusal.

Muss, a state of confusion.

Notions, a term applied to every variety of small wares.

One-horse: a one-horse thing is a thing of no value or importance, a mean and trifling thing.

Pickaninny, a negro child.

Pile, a quantity of money.

Planks, in a political sense, are the several principles which appertain to a party; *platform* is the collection of such principles.

Reckon, to; to suppose, to think.

Rile, to; to irritate, to drive into a passion.

Rooster, the common domestic cock.

Scalawag, a scamp, a scapegrace.

Shanty, a structure such as squatters erect; a temporary hut.

Skedaddle, to; to run away; a word introduced during the Civil War.

Smart, often used in the sense of considerable, a good deal, as a *smart chance*.

Span of horses, two horses as nearly as possible alike, harnessed side by side.

Spread-eagle style, a compound of exaggeration, bombast, mixed metaphor, etc.

Spry, active.

Stampede, the sudden flight of a crowd or number.

Americus

Store, a shop, as a book *store*, a grocery *store*.
Strike oil, to; to come upon petroleum; hence to make a lucky hit, especially financially.

Stump speech, a bombastic speech calculated to please the popular ear, such speeches in newly-settled districts being often delivered from stumps of trees.

Talk, great, fine (used by Shakespeare pretty much in the same sense); *tall talk* is extravagant talk.

Ticket: to vote the *straight ticket* is to vote for all the men or measures your party wishes.

Truck, the small produce of gardens; *truck patch*, a plot in which the smaller fruits and vegetables are raised,

Ugly, ill-tempered, vicious.

Vamose, to; to run off (from the Spanish *vamos*, let us go).

Will, to; to fade, to decay, to droop, to wither.

Americus, county seat of Sumter co., Ga., 70 m. s. w. of Macon, at the junction of the Central of Georgia and the Georgia & Alabama railroads. It is situated in a cotton and sugarcane district, and has an iron foundry, machine shops and chemical works. The town was founded in 1832. Pop. 1900, 7,674.

Amerigo Vespucci (à-mer-è' go vesput'chē) (1451-1512), a maritime discoverer, after whom America has been named. In 1499 he coasted along the continent of America for several hundred leagues, and the publication of his narrative, while the prior discovery of Columbus was yet comparatively a secret, led to the giving of his name to the new continent.

Ames, FISHER (1758-1808), a distinguished American statesman of the Revolutionary era, an orator of great power, famous for his eulogy on Washington.

Ames, OAKES (1804-1873), born in Easton, Mass. Congressman from 1862-1873 from the second Massachusetts district. He was interested in contracts for building the Union Pacific railroad, and his connection with the Credit Mobilier led to a congressional investigation and Mr. Ames was censured. He withdrew from political life. His son, Oliver, became governor of Massachusetts, 1889.

Amesbury, Essex co., Mass., on Merrimack River, 5 mi. n. of Newburyport. Railroads: Boston & Maine; Haverhill & Amesbury; Newburyport & Amesbury. Industries: woolen company, 45 carriage factories, shoe, hat, and bicycle factories. Surrounding country agricultural. Birthplace of Josiah Bartlett, signer of Declaration of Independence, and burial place of John G. Whittier. First frigate *Alliance* for Continental Congress built here. The town was first settled in 1630. Pop. 1900, 9,473.

Am'ethyst, a violet blue variety of quartz, highly esteemed for jewelry, found chiefly in Siberia and India. The oriental amethyst is a purple corundum. Inferior varieties are found in the U. S. See colored plate, *Gems*.

Amherst, Hampshire co., Mass., 25 mi. s. of Springfield. Railroads, Boston & Maine and Central Vermont. Industries, two large straw-

Ammoniaphone

hat factories. It is the seat of Amherst College and Massachusetts Agricultural College. It was first settled in 1731. Pop. 1900, 5,028.

Amherst (am'èrst), a seaport of British Burmah, 31 mi. s. of Moulmein, a health resort of Europeans. Pop. 3,000. The district of Amherst has an area of 15,189 sq. mi. Pop. 301,086.

Amherst, JEFFREY, Lord (1717-1796), a British general, who fought at Dettingen and Fontenoy, and commanded in America, where he took Louisburg, Ticonderoga, and Quebec, and restored the British prestige in Canada. He was raised to the peerage, became commander-in-chief, and ultimately field-marshal.

Amiens (à-mē-an), a town of France, capital of the department of Somme. It has a citadel, wide and regular streets, and several large open areas; a cathedral, one of the largest and finest Gothic buildings in Europe, founded in 1220. It has a large trade and numerous important manufactures, especially cottons and woollens. It was taken by the Germans in 1870. Pop. 88,731. The *Peace of Amiens*, concluded between Great Britain, France, Spain, and the Batavian Republic, March 27, 1802, put an end for a time to the great war which had lasted since 1793.

Ammana'ti, BARTOLOMEO (1511-1589), an Italian sculptor and architect; executed the Leda at Florence, a gigantic Neptune for St. Mark's Place at Venice, a colossal Hercules at Padua, and built the celebrated Trinity Bridge at Florence.

Am'mon, an ancient Egyptian deity, identified by the Greeks with Zeus; represented as a human being with a ram's head, or simply with the horns of a ram. There was a celebrated temple of Ammon in the Oasis of Siwah in the Libyan desert.

Ammo'nia, an alkaline substance, which differs from the other alkalies by being gaseous, and is hence sometimes called the *volatile alkali*. It is a colorless, pungent gas, composed of nitrogen and hydrogen. It was first procured in that state by Priestley, who termed it *alkaline air*. He obtained it from sal-ammoniac by the action of lime, by which method it is yet generally prepared. It is used for many purposes, both in medicine and scientific chemistry; not, however, in the gaseous state, but frequently in solution in water, under the names of *liquid ammonia*, *aqueous ammonia*, or *spirits of hartshorn*. It may be procured naturally from putrescent animal substances; artificially it is chiefly got from the distillation of coal and of refuse animal substances, such as bones, clippings and shavings of horn, hoof, etc. It may also be obtained from vegetable matter when nitrogen is one of its elements. Sal-ammoniac is the chloride of ammonium.

Ammo'niaphone, an instrument, consisting of a metallic tube containing some substance saturated with ammonia, peroxide of hydrogen, and a few flavoring compounds, fitted with a mouthpiece to breathe through, which is said to render the voice strong, clear, rich, and ringing by the inhalation of the ammoniacal vapor. It was invented by Dr. Carter Moffat, and was suggested by the presence of

Ammonite

ammonia in some quantity in the atmosphere of Italy — the country of fine singers.

Am'monite, a fossil Cephalopod, allied to the Nautilus, having a many-chambered shell, in shape like the curved horns on the ancient statues of Jupiter Ammon; characteristic of



Ammonites.

the Trias, Lias, and Oolite formations, and sometimes found in immense numbers and of great size.

Am'monites, a Semitic race frequently mentioned in Scripture, descended from Ben-Ammi, the son of Lot (Gen. 19:38), often spoken of in conjunction with the Moabites. A predatory and Bedouin race, they inhabited the desert country east of Gad, their chief city being Rabbath-Ammon (Philadelphia). Wars between the Israelites and the Ammonites were frequent; they were overcome by Jephthah, Saul, David, Uzziah, Jotham, etc. They appear to have existed as a distinct people in the time of Justin Martyr, but have subsequently become merged in the aggregate of nameless Arab tribes.

Ammo'nium, the name given to the hypothetical base of ammonia, analogous to a metal, as potassium. It has not been isolated, but it is believed to exist in an amalgam with mercury.

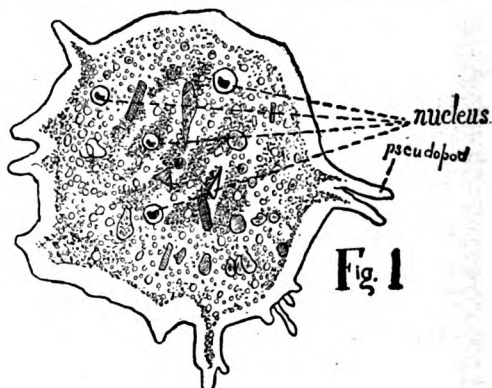
Amœba, one of the smallest and simplest animals in the world. It can be found in almost any pool of stagnant water, and clings to weeds, dead leaves, and other submerged objects. This little animal cannot be seen with the naked eye, and only in very exceptional cases does it ever get to be over a hundredth of an inch in diameter. Thus it is necessary to study it under a microscope. Under an ordinary microscope, which magnifies from 25 to 50 diameters, the amœba looks to be about as large as the head of a pin. But, under a microscope which magnifies about 300 diameters, it appears to be about the size of a silver dollar. It is shown in No. 1.

Only one who has had some experience with a microscope can see this little animal, because it is almost transparent. It appears like a shapeless blob of jelly. This jelly-like substance is called *protoplasm*, which is a substance of extreme chemical complexity. It consists of carbon, oxygen, nitrogen, hydrogen, and sulphur, and is nearly identical with the white of an egg. Protoplasm is the most elementary living matter in animal and plant structures. In regard to this substance, plants have a decided advantage over animals, for they are able to manufacture protoplasm direct

Amœba

from mineral compounds and from the atmosphere. Animals cannot produce their protoplasm in this way, but must convert dead protoplasm into living by the process of digestion. The central part of the amœba is granular and semi-transparent, and resembles ground glass in appearance. Around the outer edge is a border of perfectly transparent and colorless substance. Within the granular part may be seen a small round mass which is a little darker than the rest, and is called the nucleus. This nucleus is very important, as without it the amœba could not live or reproduce its own kind. (See Nos. 1 and 2.)

There is another little structure in the granular part besides the nucleus. This is a clear rounded space which periodically disappears with a sudden contraction and then slowly reappears. It is called the *contractile vacuule*, and contains a watery fluid. (No. 2.) If an amœba is watched under a microscope it will be noticed that it does not retain quite the same shape for long together. In other words, the little animal has the power of changing its form. It does this by sending out little finger-like processes which are called *pseudopodia* or "false feet." The process starts as a little pimple-like elevation; this increases in size until at last the granular matter follows after, and thus the shape of the animalcule is changed. (No. 4 shows the different forms which one of the little animals assumed in



the space of five minutes.) Of course the volume of the amœba is not changed by this process, as every pseudopod thus protruded from one part of the body necessitates the withdrawal of an equal volume from some other part. The amœba also has the power of drawing in these feet. In addition to being the means of locomotion these pseudopods carry the food to the "mouth." When the edge of the animal comes in contact with anything which it can digest, one of these little finger-like processes runs out on one side of it and another on the other side. Then the two pseudopods come together on the opposite side of the prey and surround it. The food particle is thus forced up on top of the amœba,

Amœba

where it comes in contact with a small quantity of fluid which has the power to digest it, just as the human stomach has power to digest meat and potatoes. When all the nutriment in the food particle has been extracted, the remaining part is pushed right on over the top of the animal, and is finally thrown off on the side opposite to where it was taken on. The part of the food which is extracted goes to make up new protoplasm or living material. It is assimilated or converted into the actual living substance.

It is self-evident that if the amœba continues to absorb food material it will increase in size. And this leads to the consideration of the method in which this animalcule produces its own kind. If a human being eats very heartily he will grow. But there is a limit to the size he can attain. He is constantly throwing off waste material of the body, and this tends to keep the size about the same. Not so with the amœba. As has been seen, it takes into its system only such material as it can thoroughly assimilate.

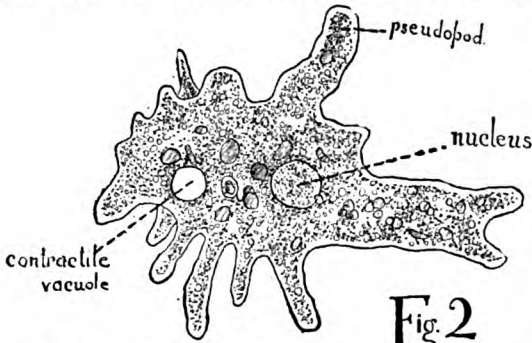


Fig 2

And when it has taken in or absorbed—converted into protoplasm—a food particle; it cannot throw it off. The question naturally arises: "What is there to prevent the amœba from growing to the size of a peck measure?" It is answered by describing the method in which the animalcule produces new individuals. This is done in a very simple way. The

Amphibia

Thus, when it has extended itself to a certain length, the furrow which appears across the middle of the drawn-out body deepens, until finally the animalcule separates into two separate beings, which henceforward lead an independent existence. This is the simplest

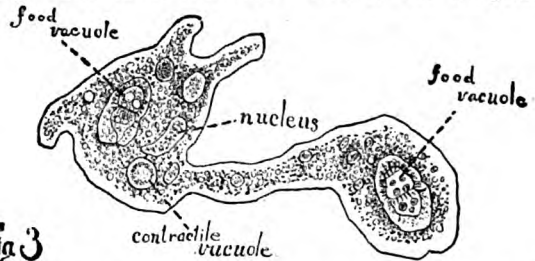


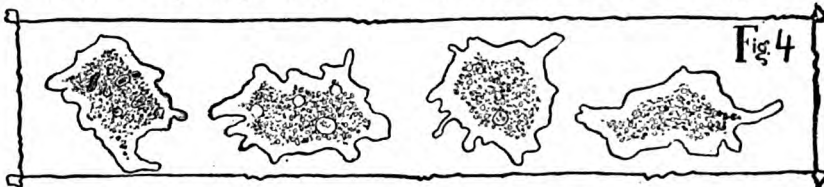
Fig 3

method of reproduction known, and is called *simple fission*. (No. 3 shows the process of division.) The animal simply divides into two, both exactly alike, and neither of the animals dies. They go on dividing, and, if there were no outside influences, the amœba would be practically immortal.

Amoo-Daria, a Russian territory of Central Asia, on the east of the Amoo, and southeast of the Sea of Aral. Area 40,000 sq. mi.; pop. 220,000.

Ampere (an-par), ANDRE-MARIE (1775-1836), a celebrated French mathematician and philosopher, founder of the science of electro-dynamics, professor of mathematical analysis at the Polytechnic School, Paris, and of physics at the College of France. What is known as *Ampere's Theory* is that magnetism consists in the existence of electric currents circulating round the particles of magnetic bodies, being in different directions round different particles when the bodies are unmagnetized, but all in the same direction when magnetized.

Amphibia, a class of vertebrate animals, which in their early life breathe by gills or branchiæ, and afterward partly or entirely by lungs. The Frog, breathing in its tadpole state by gills and afterward throwing off these organs and breathing entirely by lungs in its adult state, is an example of the latter



nucleus, which, as stated above, is a very vital part of the structure of the amœba, first divides into two. Then the whole organism elongates; that is, it flows out lengthwise, as jelly would do, and this process draws the two parts of the nucleus apart. This protoplasmic substance acts just like gum when it is stretched. It will stretch so far and then it will break in two. In other words, it is elastic.

phase of amphibian existence. The Proteus of the underground caves of Central Europe exemplifies forms in which the gills of early life are retained throughout life, and in which lungs are developed in addition to the gills. A second character of this group consists in the presence of two occipital "condyles," or processes by means of which the skull articulates with the spine or vertebrae column, rep-

Amphictyonic League

tiles possessing one condyle only. The class is divided into four orders: the Ophiomorpha (or serpentiform), represented by the Blind-worms, in which limbs are wanting and the body is snake-like; the Urodela or "Tailed" Amphibians, including the Newts, Proteus, Siren, etc.; the Anoura, or tailless Amphibia, represented by the Frogs and Toads; and the Labyrinthodontia, which includes the extinct forms known as Labyrinthodons.

Amphe'tyonic League (or council), in ancient Greece, a confederation of tribes for the protection of religious worship, but which also discussed questions of international law, and matters affecting their political union. The most important was that of the twelve northern tribes which met alternately at Delphi and Thermopylæ. The tribes sent two deputies each, who assembled with great solemnity; composed the public dissensions, and the quarrels of individual cities, by force or persuasion; punished civil and criminal offenses, and particularly transgressions of the law of nations, and violations of the temple of Delphi. Its calling on the states to punish the Phocians for plundering Delphi caused the Sacred Wars, 595-586, 448-447, 357-346 B. C.

Amphi'on, in Greek mythology, son of Zeus and Antiöpë, and husband of Niöbë; had miraculous skill in music, being taught by Mercury, or, according to others, by Apollo. In poetic legend he is said to have availed himself of his skill when building the walls of Thebes—the stones moving and arranging themselves in proper position at the sound of his lyre.

Amphithe'ater, an ancient Roman edifice of an oval form without a roof, having a central area (the *arena*) encompassed with rows of seats, rising higher as they receded



Coliseum at Rome.

from the center, on which people used to sit to view the combats of gladiators and of wild beasts, and other sports. The Colosseum at Rome is the largest of all the ancient amphitheaters, being capable of containing from 50,000 to 80,000 persons. That at Verona is one of the best examples remaining. Its dimensions are 502 feet by 401, and 98 feet high. The name means "both-ways theater," or "theater all round," the theater forming only a semicircular edifice.

Amsterdam

Amphitri'te, in Greek mythology, daughter of Oceānus and Tethys, or of Nereus and Doris, and wife of Poseidon (or Neptune), represented as drawn in a chariot of shells by Tritons, with a trident in her hand.

Amphit'ryon, in Greek legend, king of Thebes, son of Alcæus, and husband of Alcmena. Plautus, and after him Molière, have made an amour of Zeus with Alcmena the subject of amusing comedies.

Ampudia, PEDRO DE, Mexican, was appointed general by Santa Anna in 1840; in 1842, he commanded the land forces in the siege of Campeachy, Yucatan. Later he was in command of Monterey, where, in 1846, he surrendered to General Taylor of the U. S.

Amputa'tion, in surgery, that operation by which a member is separated from the body according to the rules of the science. See *Surgery*.

Amra'oti, a town of British India in Berár; it is celebrated for its cotton, and is a place of good trade. Pop. 23,550. The district has an area of 2,767 sq. mi.; pop. 546,448.

Am'ritsir (or Amritsar) ("the pool of immortality"), a flourishing commercial town of Hindustan, capital of a district of the same name, in the Punjab, the principal place of the religious worship of the Sikhs. It has considerable manufactures of shawls and silks; and receives its name from the sacred pond constructed by Ram Das, the apostle of the Sikhs, in which the Sikhs and other Hindus immerse themselves that they may be purified from all sin. Pop. 151,896. The district of Amritsir has an area of 1,574 sq. mi. Pop. 893,266.

Am'ru, originally an opponent, and subsequently a zealous supporter of Mohammed, and one of the ablest of the Mohammedan warriors. He brought Egypt under the power of the Caliph Omar in 638, and governed it wisely till his death in 636. The burning of the famous Alexandrian Library has been generally attributed to him, though only on the authority of a writer who lived six centuries later.

Am'sterdam (that is, "the dam of the Amstel"), one of the chief commercial cities of Europe, capital of Holland. On account of the lowness of the site of the city the greater part of it is built on piles. It is divided by numerous canals into about 90 islands, which are connected by nearly 300 bridges. Among its numerous industries may be mentioned as a speciality the cutting and polishing of diamonds. The harbor, formed by the Y river, lies along the whole of the north side of the city, and is surrounded by various docks and basins. The trade is very great, being much facilitated by the great ship-canal (15 mi. long. 22-26 feet deep, constructed 1865-76), which connects the Y directly with the North Sea. Another canal, the North Holland Canal (46 mi. long, 20 feet deep), connects Amsterdam with the Helder. During the seventeenth and eighteenth centuries Amsterdam was one of the wealthiest and most flourishing cities in the world. Its forced alliance with France

Amsterdam

ruined its trade, but since 1813 its commerce has revived. Pop. 417,539.

Amsterdam, Montgomery co., N. Y., on Mohawk River, 33 mi. w. of Albany. Railroads: N. Y. C. & H. R., and West Shore. Industries: carpet mills, linseed oil, broom, carriage springs, and knitted goods factories. Surrounding country agricultural. The town was first settled about 1776 and became a city in 1885. Pop. 1900, 20,929.

Amuck (Amuk), to run, a phrase applied to natives of the eastern Archipelago who are occasionally seen to rush out in a frantic state, making indiscriminate and murderous assaults on all that come in their way. The cause of such outbursts is not well known.

Amyl'ic Alcohol, another name for fusel oil.

Amyrida'ceæ, a natural order of plants consisting of tropical trees or shrubs, the leaves, bark, and fruit of which abound in fragrant, resinous, and balsamic juices. Myrrh, frankincense, and the gum-elemi of commerce are among their products.

Anabap'tists, a name given to a Christian sect by their adversaries, because, as they objected to infant baptism, they rebaptized those who joined their body. The founder of the sect appears to have been Nicolas Storch, a disciple of Luther. He incited the peasantry of Suabia and Franconia to insurrection. This insurrection was quelled in 1525. In 1534 the town of Münster in Westphalia became their center of action. Bockhold became leader, assuming the name of John of Leyden, king of the New Jerusalem, and Münster became a theater of all the excesses of fanaticism, lust, and cruelty. They rejected the practise of polygamy, community of goods, and intolerance toward those of different opinions which had prevailed in Münster. The application of the term Anabaptist to the general body of Baptists throughout the world is unwarranted. The Baptists repudiate the name Anabaptist.

Anab'asis ("a going up"), the Greek title of Xenophon's celebrated account of the expedition of Cyrus the Younger against his brother Artaxerxes, king of Persia. The title is also given to Arrian's work which records the campaigns of Alexander the Great.

Anach'ronism, an error of chronology by which things are represented as co-existing which did not co-exist; applied also to anything foreign to, or out of keeping with, a specified time. The anachronisms of authors and painters have furnished materials for many amusing magazine articles. In art, some of the most glaring instances have occurred in the works of the Dutch school, as for instance arming scriptural characters with guns or attiring them in the costume of the seventeenth century.

Anacon'da, the popular name of two of the largest species of the serpent tribe; viz., a Ceylonese species of the genus *Python*, said to have been met with, 33 feet long; and a native of tropical America, allied to the *boa-constrictor*, and the largest of the serpent tribe,

Anakim

attaining the length of 40 feet. See *Boa-constrictor*.

Anaconda, Deer Lodge co., Mon., the center of an active mining district. Population 1900, 9,453.

Anac'reon, an amatory lyric Greek poet of the sixth century B. C., native of Teos, in Ionia. Only a few fragments of his works have come down to us; the collection of odes that usually passes under the name of *Anacreon* is mostly the production of a later time.

Anæsthet'ics, medical agents employed for the removal of pain, especially in surgical operations, by suspending sensibility either locally or generally. Various agents have been employed for both of these purposes, from the earliest times, but the scientific use of anæsthetics may be said to date from 1800, when Sir Humphrey Davy made experiments on the anæsthetic properties of nitrous oxide, and recommended its use in surgery. In 1818 Faraday established the anæsthetic properties of sulphuric ether, but this agent made no advance beyond the region of experiment, till 1844, when Dr. Wells, a dentist of Hartford, Conn., applied the inhalation of sulphuric ether in the extraction of teeth, but owing to some misadventure did not persevere with it. The example was followed in 1846 by Dr. Morton, a Boston dentist, who also extended the use of ether to other surgical operations. The practise was soon after introduced into England by Mr. Liston, and a London dentist, Mr. Robinson. A few weeks later Sir James Simpson made the first application of ether in a case of midwifery. This was early in 1847. Toward the end of the same year Simpson had his attention called to the anæsthetic efficacy of chloroform, and announced it as a superior agent to ether. This agent has since been the most extensively used anæsthetic, though the use of ether still largely prevails in the U. S. In their general effects ether and chloroform are very similar: but the latter tends to enfeeble the action of the heart more readily than the former. For this reason great caution has to be used in administering chloroform where there is weak heart action from disease. Local anæsthesia is produced by isolating the part of the body to be operated upon, and producing insensibility of the nerves in that locality. Dr. Richardson's method is to apply the spray of ether, which, by its rapid evaporation, chills and freezes the tissues and produces complete anæsthesia. This mode of treatment, besides its use in minor surgical operations, has recently begun to have important remedial applications. A valuable local anæsthetic now employed is cocaine. See *Coca*.

Anahuac (â-nâ-wâk') ("near the water"), an old Mexican name applied to the plateau of the city of Mexico, from the lakes situated there, generally elevated from 6,000 to 9,000 feet above the sea.

An'akim, the posterity of Anak, the son of Arba, noted in sacred history for their fierceness and loftiness of stature. Their strong-

Analysis

hold was Kirjath-arba, or Hebron, which was taken and destroyed by Caleb and the tribe of Judah.

Anal'ysis, the resolution of an object, whether of the senses or the intellect, into its component elements. In philosophy it is the mode of resolving a compound idea into its simple parts, in order to consider them more distinctly, and arrive at a more precise knowledge of the whole. It is opposed to *synthesis*, by which we combine and class our perceptions, and contrive expressions for our thoughts, so as to represent their several divisions, classes, and relations.

Analysis, in mathematics, is, in the widest sense, the expression and development of the functions of quantities by calculation; in a narrower sense the resolving of problems by algebraic equations. The analysis of the ancients was exhibited only in geometry, and made use only of geometrical assistance, whereby it is distinguished from the analysis of the moderns, which extends to all measurable objects, and expresses in equations the mutual dependence of magnitudes. Analysis is divided into lower and higher; the lower comprising, besides arithmetic and algebra, the doctrines of functions, of series, combinations, logarithms, and curves; the higher comprising the differential and integral calculus, and the calculus of variations.

In chemistry, analysis is the process of decomposing a compound substance with a view to determine either (a) what elements it contains (*qualitative analysis*), or (b) how much of each element is present (*quantitative analysis*). Thus by the first process we learn that water is a compound of hydrogen and oxygen, and by the second that it consists of one part of hydrogen by weight to eight parts of oxygen.

Anam', a country of Asia occupying the e. side of the Indo-Chinese Peninsula. It is composed of three parts: Tonquin in the n.; Cochinchina in the s.; and the territory of the Laos tribes, s.w. of Tonquin. Area together, 170,000 sq. mi.; pop. 15,000,000 — 9,000,000 in Tonquin. Tonquin is mountainous on the north, but in the east is nearly level, terminating toward the sea in an alluvial plain yielding good crops of rice, cotton, fruits, ginger, and spices, and a great variety of varnish-trees, palms, etc. The principal river is the Song-ka, which has numerous tributaries, many of them being joined together by canals, both for irrigation and commerce. Tonquin is rich in gold, silver, copper, and iron. Cochinchina is, generally speaking, unproductive, but contains many fertile spots, in which grain, leguminous plants, sugar-cane, cinnamon, etc., are produced in great abundance. Agriculture is the chief occupation, but many of the inhabitants are engaged in the spinning and weaving of cotton and silk into coarse fabrics, the preparation of varnish, iron-smelting, and the construction of ships or junks. The inhabitants are said to be the ugliest of the Mongoloid races of the peninsula, being under the middle size and less robust than the surrounding peoples. Their language is monosyl-

Anastatic Printing

labic, and is connected with the Chinese. The religion of the majority is Buddhism, but the educated classes hold the doctrines of Confucius. The principal towns are Hanoi, the capital of Tonquin, and Hué, the capital of Cochinchina, and formerly of the whole empire. Anam was conquered by the Chinese in 214 B. C., but in 1428 A. D. it completely won its independence. The French began to interfere actively in its affairs in 1847 on the plea of protecting the native Christians. By the treaties of 1862 and 1867 they obtained the southern and most productive part of Cochinchina, subsequently known as French Cochinchina; and in 1874 they obtained large powers over Tonquin, notwithstanding the protests of the Chinese. Finally in 1883 Tonquin was ceded to France, and next year Anam was declared a French protectorate. After a short period of hostilities with China the latter recognized the French claims, and Tongkin is now directly administered by France, while Anam is entirely under French direction.

Anani'as, a disciple at Jerusalem, who, having with his wife Sapphira, committed a fraud, was with her struck dead.

Anarajapoo'ra (or Anuradhapura), a ruined city, the ancient capital of Ceylon, built about 540 B. C., and said to have covered an area of 300 sq. mi., doubtless a great exaggeration. The great object of interest is the sacred Bo-tree planted over 2,000 years, and probably the oldest historical tree in the world, but shattered by a storm in 1887.

An'archists, a revolutionary sect or body setting forth as the social ideal the extreme form of individual freedom, and holding that all government is injurious and immoral, that the destruction of every social form now existing must be the first step to the creation of a new world. Their recognition as an independent sect may be dated from the secession of Bakunin and his followers from the Social Democrats at the congress of The Hague in 1872, since which they have maintained an active propaganda. Their principal journals have been *La Révolte* (Paris), the *Freiheit* (New York), *Liberty* (Boston), and the *Anarchist* (London). Akin to the Nihilists, of alien birth, the Anarchists in America, with the exception of a bomb outrage in Chicago, have accomplished little.

Anasta'sius I (491-518 A. D.), Emperor of the East, succeeded Zeno, at the age of sixty. He was a member of the imperial life-guard, and owed his elevation to Ariadne, widow of Zeno, whom he married. He distinguished himself by suppressing the combats between men and wild beasts in the arena, abolishing the sale of offices, building the fortifications of Constantinople, etc.

Anastat'ic Printing, a mode of obtaining fac-simile impressions of any printed page or engraving by transferring it to a plate of zinc, which, on being subjected to the action of an acid, is etched or eaten away with the exception of the parts covered with the ink, which parts, being thus protected from the action of

Anatomy

the acid, are left in relief so that they can readily be printed from.

Anatomy is that branch of biological science which treats of the structure of organized bodies. The words *anatomy* and *dissection* are synonymous etymologically; but custom, while retaining the original meaning of the latter word (literally, to cut apart) has broadened that of the former until it has come to include all the many sciences embraced within the one great science of organic form. Thus we speak of *Human, Animal, and Vegetable Anatomy*; of *Embryology*, or developmental anatomy; of *Comparative Anatomy*, which teaches the variations of corresponding structures in different animals; of *Philosophical Anatomy*, which teaches *Homology*, or the fundamental identity of organs arising from the same parts of the embryos of different species; of *Histology*, or the study of the minute anatomy of the tissues; of *Descriptive Anatomy*, treating of the gross form and relations of organs and structure; and finally of *Systematic and Topographical* (regional or surgical) *Anatomy*; the former treating of systems; e. g., digestive, genito-urinary, nervous, vascular, muscular systems; the latter treating of regions made up of parts of several systems; e. g., neck, abdomen, arm, leg. We will consider here only *Human Anatomy*, and under this head only *Systematic Anatomy*. For other branches of the subject, see *Histology* and *Embryology*.

SYSTEMATIC ANATOMY.—In response to the tendency to specialization observed in many celled organisms, the cells of the human body group themselves into systems, each performing certain functions, although the law of the physiological division of labor imposes the closest interdependence between each system and its yoke-fellows. In every system we find one or more most highly specialized cell-groups to which we give the name of organs. Entering intimately into the composition of organs, as well as binding them together and keeping them in proper correlation with other organs, we find tissues. These latter are the ultimate results of cell-differentiation, and are considered under *Histology*. We recognize the following principal systems sufficiently isolated by function to require separate consideration: 1, Skeleton, Osseous System, the supporting framework of the body; 2, Articular System the system of joints; 3, Muscular System, a series of elastic and voluntarily contractile fibers, the ends of which are inserted into the extremities of the bones; 4, Vascular System, a series of tubes which supply the tissues with nourishment and carry away the effete products of the body; 5, Respiratory System, through which oxygen enters the blood, and carbon-dioxide is thrown off; 6, Digestive System, through which soluble food is elaborated from insoluble diet; 7, Urinary System, effete products taken up by the blood are eliminated in part through this system; 8, Reproductive Organs; 9, Nervous System. All of these various systems are united anatomically by masses of connective tissue.

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Osseous System, or Skeleton. Articular System, or Joints.—The skeleton is composed of 200 bones, of which 74 belong to the *Axial* skeleton (head, neck, and trunk), and 126 to the extremities, or *Appendicular* skeleton. This number does not include certain small bones developed in tendons as they pass across bony angles.

Axial Skeleton.—The vertebral column, or spine, is made up of 26 bones, of which 7, called cervical vertebrae, are located in the neck; 12, called dorsal or thoracic vertebrae, lie in the thoracic region, or chest, and support 24 ribs and the sternum; 5 lie in the loin or lumbar region and are called lumbar vertebrae; the sacrum (made up during early life of five sacral vertebrae which fuse into one solid mass in the adult), in the sacral or pelvic region, forming a kind of keystone, by which the weight of the body is transmitted to the pelvic girdle and the lower extremities; and the coccyx (made up during early life of 4 rudimentary vertebrae), in the coccygeal region. Each vertebrae is composed of a body, or centrum, from which arise two arches, a neural arch, enclosing a segment of the spinal cord or marrow, lying in the neural or spinal canal, and a hæmal, or visceral arch enclosing more or less completely a segment of the great visceral cavity found in the neck, chest, and abdomen. The neural canal is complete except in the lower sacral and coccygeal regions. The visceral arches, however, are subject to many vicissitudes, and it is only in the upper thoracic region that we find them completely encircling the visceral cavity, each arch being completed by two ribs and a segment of the sternum or breast-bone. In the lower thoracic region the ribs do not completely encircle the cavity. Strength, combined with great elasticity and flexibility, is provided for the spinal column by anterior, posterior, and lateral ligaments, by pads of cartilage placed between the vertebrae, and by an alternation of anterior and posterior curves in the four principal regions. The ribs are tipped anteriorly with costal cartilages and the seven upper (true) ribs are joined to the sternum by their cartilages. Of the remaining five ribs (false), the upper three are fixed to the cartilages above, but not to the sternum, and the lower two are free or floating. In the sternum we recognize three pieces, united in the adult—manubrium or handle, gladiolus or body, and xiphoid or ensiform appendix.

The axial skeleton is completed by the skull and hyoid bone—23 bones, of which 8 (occipital, sphenoid, ethmoid, frontal, 2 parietals, 2 temporals) enter into the cranium or brain case, and 15 (vomer, 2 nasals, 2 lachrymals, 2 palates, 2 malar, 2 superior maxillaries, 2 maxillo- or inferior turbineals, inferior maxillary, hyoid) form the bony framework of a series of arches (face and neck) surrounding the organs of special sense and the upper orifices of the respiratory and digestive organs. See *Embryology*. Springing upward from the axis is a series of arches composed of thin, flat bones enveloping the brain, and either

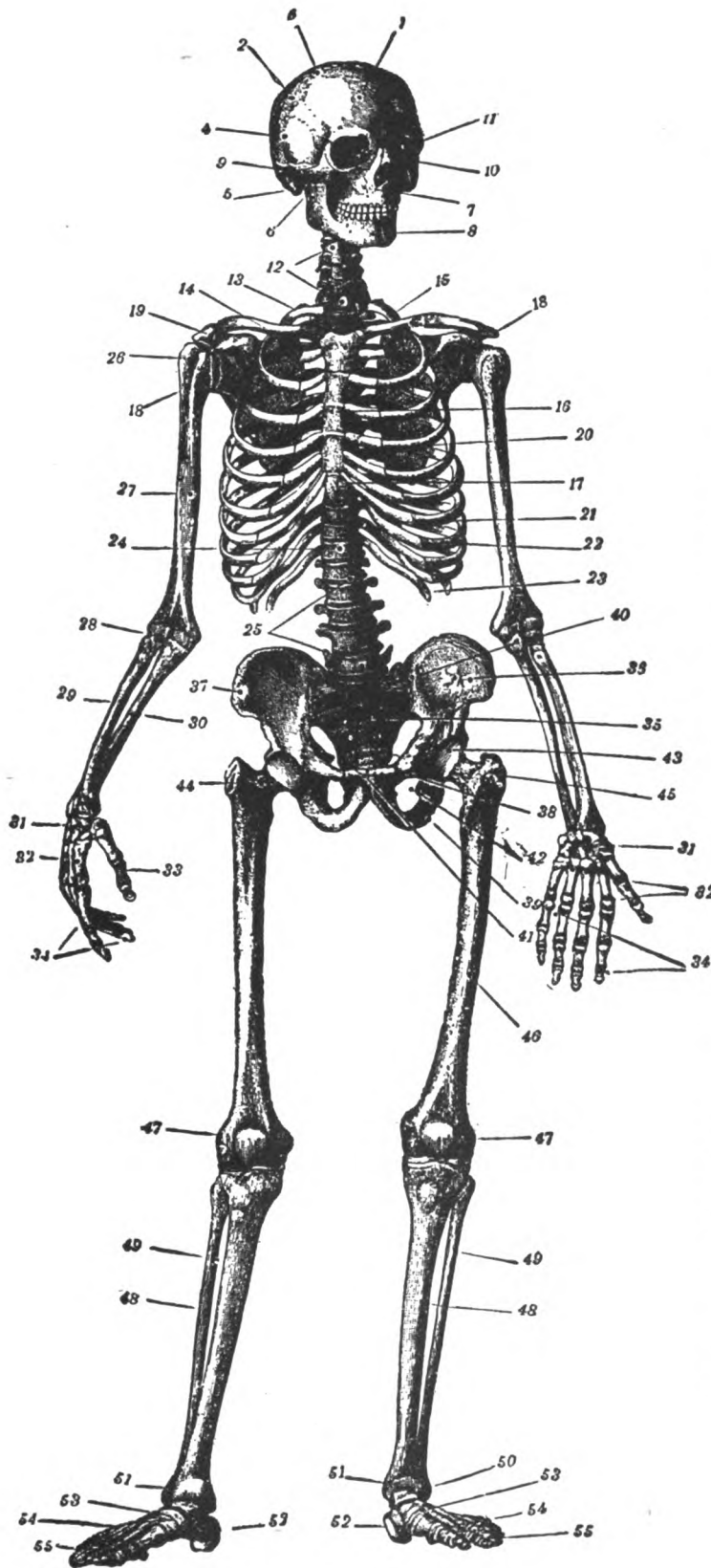
paired, or developed from paired ossific deposits. These arches bear a close resemblance to the neural arches of the vertebrae, especially when we consider that the brain is merely the expanded end of the spinal cord. Thrown downward from the cranio-facial axis are other arches: (a) enclosing the nose and forming the roof of the mouth; (b) the lower jaw and the floor of the mouth. Certain bones are also formed in connection with the organs of special sense, these organs being pushed in above or between the arches: (a) malar and lachrymal bones in relation to the organ of vision, and above the palato-maxillary arch; (b) turbinal bones for the reception of the organ of smell, between the two maxillaries; (c) petrous and mastoid parts of the temporal bones, containing the organ of hearing, and lying between the occipital and sphenoid bones; (d) the organ of taste, supported below and behind by the hyoid bone, and pushed in between the maxillary and mandibular arches; (e) the organ of voice (larynx) suspended from the hyoid bone and surmounted by one or more very rudimentary cartilaginous arches. The cavity containing the eye-ball and its machinery is called the *orbit*; the passage leading from without into the petrous and mastoid part of the temporal bone is called the *external auditory meatus*; the parallel nasal passages leading from the nostrils to the throat are called *nares*. Opening into the nares are chambers or sinuses in the frontal, ethmoid, sphenoid, and maxillary bones, containing air and modifying the voice as by a sounding-board. A bony bar running from the outer margin of the orbit to just above the external auditory meatus is called the *Zygoma*, and partly encloses the great temporal and *Zygomatic* fossæ for the reception of the muscles of mastication. The upper and lower jaw are provided with alveolar processes containing sockets for the reception of teeth, of which there are 32 in the adult jaws (8 incisors, 4 canines, 8 bicuspid, 12 molars), and 20 (milk or temporary) teeth in the jaws of the infant. The mandible, or inferior maxillary, joins the skull by means of an articular condyle, fitting into the glenoid fossa of the temporal bone, and is the only movable bone of the skull, the others being immovably united by sutures. Separating the mouth from the nose is the hard palate, made up of horizontal plates from the maxillary and palate bones. The cranial cavity is smooth and unbroken above, but broken into fossæ below for the reception of the cerebrum and cerebellum. The spinal cord leaves the cranial cavity through the *foramen magnum* (foramen: a hole or opening) in the occipital bone, on either side of which can be seen the occipital condyles for articulation with the atlas. Other openings give passage to nerves and vessels to and from the brain: through the *optic foramen* pass the optic nerve and ophthalmic artery; through the sphenoidal fissure between the wings of the sphenoid pass the nerves to the orbit; through the *carotid foramen* passes the artery of that name; through the *jugular foramen* pass the jugular vein and

the ninth, tenth, and eleventh nerves; through the round and oval openings pass branches of the fifth nerve; through the internal auditory meatus pass the facial and auditory nerves; through the *anterior condylar foramen* passes the twelfth nerve. The hyoid bone lies between the tongue and the larynx and is joined to the skull (styloid process of temporal bone) by a stylo hyoid ligament. The hyoidean arch is the last of the visceral arches of the human skull.

Appendicular Skeleton.—This skeleton comprises the shoulder girdle with the upper extremities (64 bones), and the pelvic girdle with the lower extremities (62 bones). The shoulder girdle is made up of clavicle or collar-bone, and scapula or shoulder-blade, bound together at the outer extremities by ligaments, and joined to the trunk at one point only by a small gliding joint between the inner extremity of the clavicle and the upper piece of the sternum. By thus pivoting the upper extremity on the trunk, there is secured great freedom of motion with little loss of power by joint friction. The clavicle is a slender bone shaped like the Roman *S*, lying between sternum and scapula. The scapula is a flat, irregularly triangular bone lying close to the side of the thorax, but separated and suspended from it by muscles. The part applied to the thorax is the *sub-scapular fossa*; the part looking backward and outward is divided into *supra-* and *infra-spinous fossæ* by a prominent spine, which projects upward and outward. At the outer angle of the scapula, between coracoid, clavicle, and acromion, is the *glenoid fossa* for the reception of the humeral head (ball and socket joint). The glenoid and humerus are held together in the shoulder joint by the action of the shoulder muscles, and by a loose sac called the capsular ligament, permitting a wide range of motion in almost every direction. The humerus, or arm bone, is a long bone, at the upper extremity of which are found a head, neck, and two tuberosities; below these is a long, rounded shaft, grooved behind by the musculo-spiral nerve, and supporting an irregularly flattened inferior extremity, presenting a trochlea (pulley surface) and capitellum (head) for articulation with the ulna and radius respectively. In the forearm (or antibrachium) are found the radius externally and the ulna internally. These bones are united to the humerus by a hinge-joint, permitting only antero-posterior motion, the head of the radius playing on the capitellum, and the ulna presenting a great sigmoid notch for the reception of the trochlea (or pulley) of the humerus. At their inferior extremities the forearm bones join the carpus, the radius directly, the ulna indirectly through the intervention of a small fibro-cartilage. The ulna is heaviest at the humeral end, the radius at the carpal end. The carpus or wrist (8 bones) is irregularly biconvex and made up of two rows of small bones united by ligaments and lying between forearm and palm. The metacarpus (palm) is made up of five metacarpal bones numbered from thumb to little

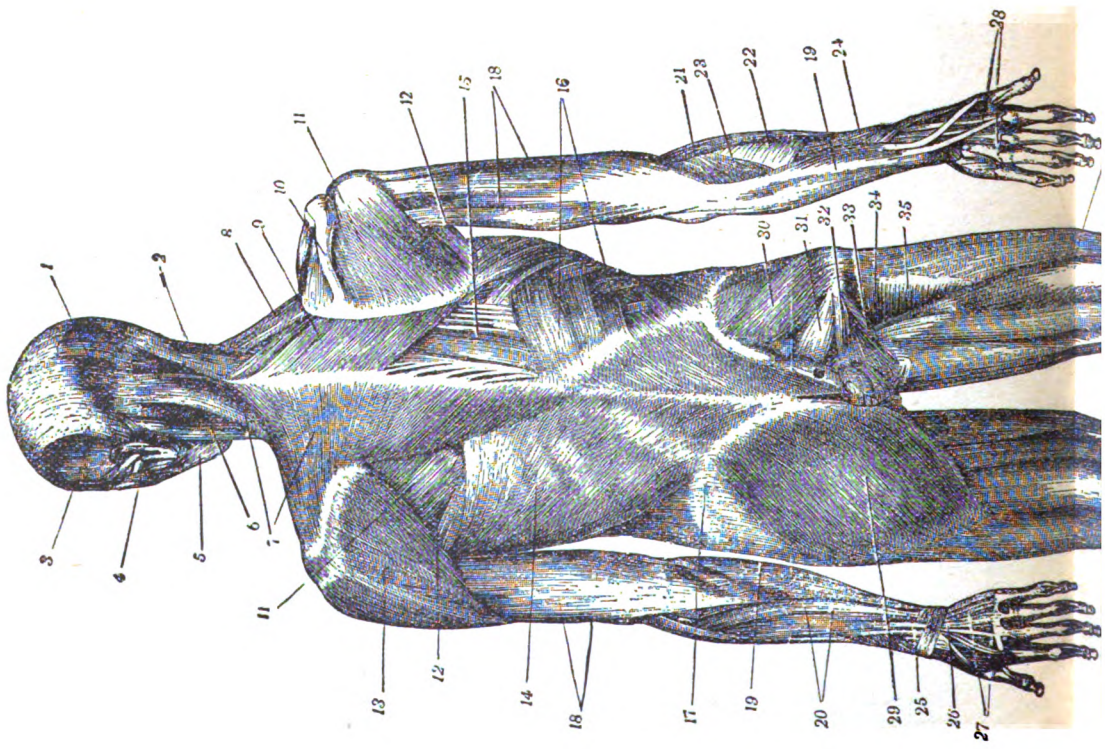
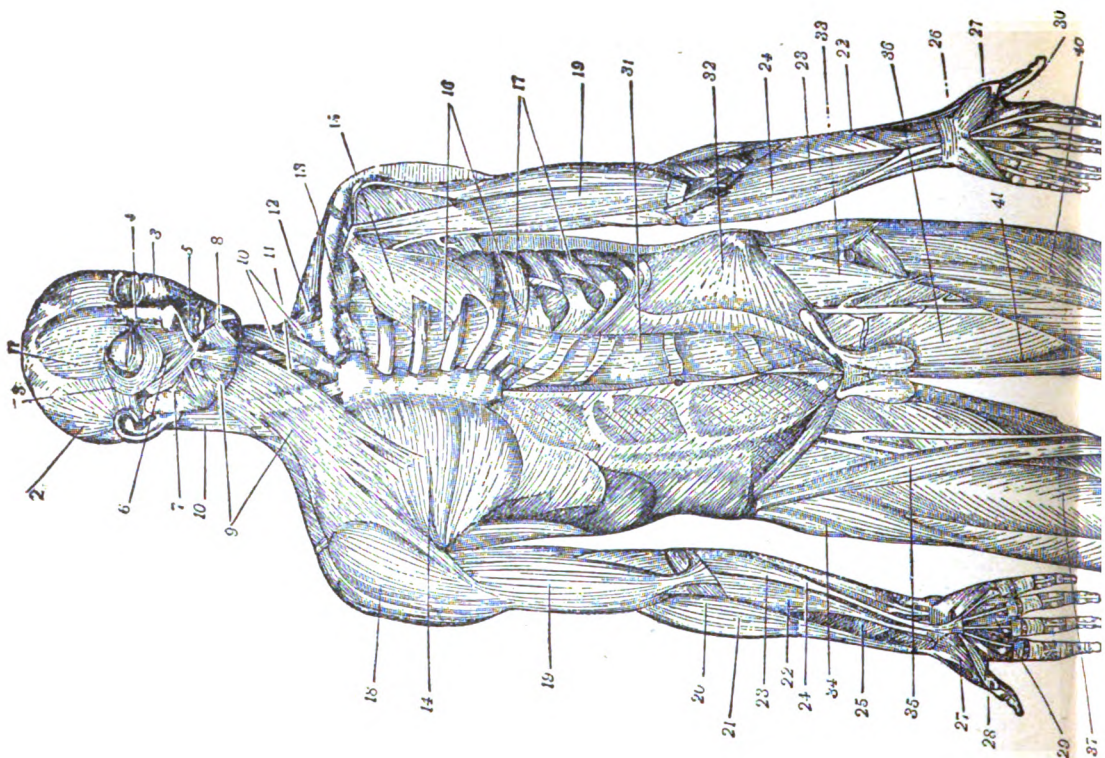
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FRONT VIEW OF SKELETON.

1. Frontal Bone.
2. Parietal Bone.
3. Coronal Suture.
4. Squamous portion of Temporal Bone.
5. Mastoid Process of Temporal Bone.
6. Zygoma.
7. Superior Maxillary Bone.
8. Inferior Maxillary Bone.
9. Temporo-Maxillary Articulation.
10. Nasal Bone.
11. Orbit.
12. Cervical Vertebra.
13. First Rib.
14. Clavicle.
15. Manubrium.
16. Body of Sternum.
17. Ensiform Process of Sternum.
18. Shoulder Blade (Scapula).
19. Acromion Process of Scapula.
20. Costal Cartilage.
21. Seventh Rib.
22. Eighth (First False) Rib.
23. Twelfth (Fifth False) Rib.
24. Twelfth Dorsal Vertebra.
25. Lumbar Vertebra.
26. Head of Humerus.
27. Humerus.
28. Elbow-Joint.
29. Radius.
30. Ulna.
31. Wrist.
32. Metacarpal Bone.
33. Thumb.
34. Phalanges of Fingers.
35. Sacrum.
36. Ilium.
37. Crest of the Ilium.
38. Pubic Bone.
39. Ischium.
40. Sacro-Iliac Symphysis.
41. Pubic Symphysis.
42. Obturator Foramen.
43. Head of Femur.
44. Neck of Femur.
45. Greater Trochanter.
46. Femur.
47. Patella Knee-pan.
48. Tibia.
49. Fibula.
50. External Malleolus.
51. Internal Malleolus.
52. Os Calcis.
53. Tarsus.
54. Metatarsal Bone.
55. Phalanges of Toes.



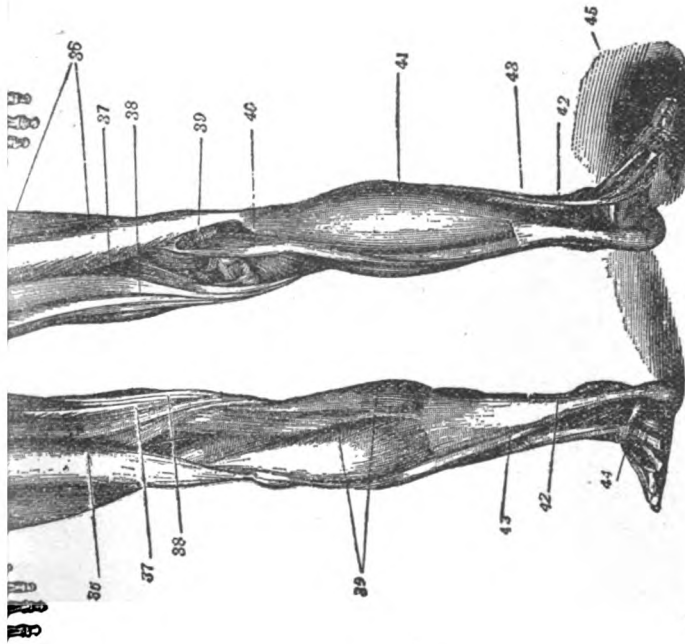


Fig. 1.

BACK VIEW OF MUSCLES.

On the right side of the body the external muscles have been partly stripped off.

1. Occipital portion of Occipito-Frontalis Muscle.
2. Splenius Capitis Muscle.
3. Temporal Muscle.
4. Orbicularis Palpebrarum Muscle.
5. Masseter Muscle.
6. Sterno-Cleido-Mastoid Muscle.
7. Trapezius Muscle.
8. Levator Anguli Scapulae Muscle.
9. Rhomboides Muscle.
10. Supra-Spinatus Muscle.
11. Infra-Spinatus Muscle.
12. Teres Major Muscle.
13. Deltoid Muscle.
14. Latissimus Dorsi Muscle.
15. Longissimus Dorsi Muscle.
16. Serratus Posticus Inferior Muscle.
17. Ridge of the Innominate Bone.
18. Triceps Muscle.
19. Flexor Carpi Ulnaris Muscle.
20. Extensor Communis Digitorum Muscle.
21. Supinator Longus Muscle.
22. Supinator Brevis Muscle.
23. Anconeus Muscle.
24. Extensor Ossis Metacarpi Pollicis Muscle.
25. Extensor Longus Pollicis Muscle.
26. Posterior Annular Ligament.
27. Extensor Communis Digitorum Tendon.
28. Interossei Muscles.
29. Glutens Maximus Muscle.
30. Glutens Minimus Muscle.
31. Pyriformis Muscle.
32. Gernellus Superior Muscle.
33. Obturator Externus Muscle.
34. Gemellus Inferior Muscle.
35. Quadratus Femoris Muscle.
36. Biceps Muscle.
37. Semi-tendinosus Muscle.
38. Semi-membranosus Muscle.
39. Gastrocnemius Muscle.
40. Peroneus Longus Muscle.
41. Soleus Muscle.
42. Tendo Achillis.
43. Peroneus Brevis Muscle.
44. Annular Ligament.
45. Extensor Longus Digitorum Tendons.

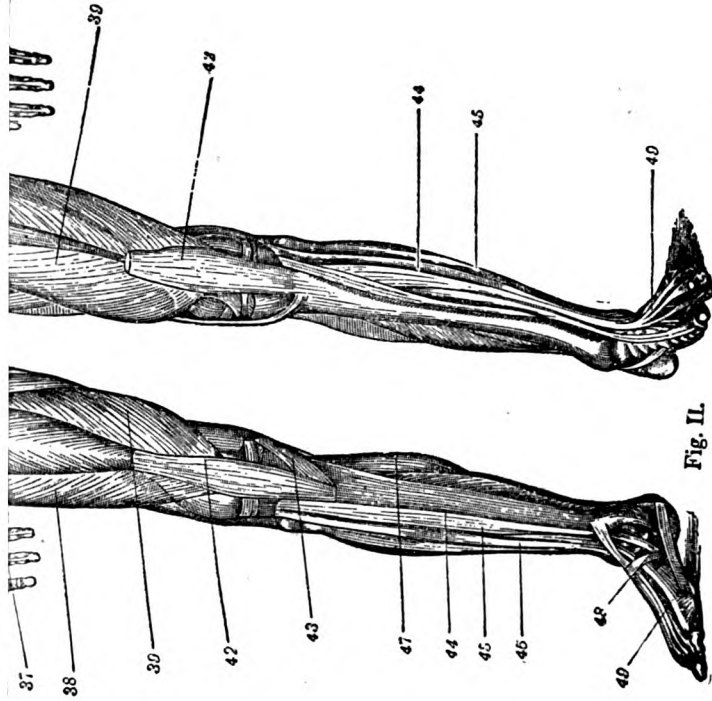


Fig. II.

FRONT VIEW OF MUSCLES.

On the left side the external muscles have been partly stripped off.

1. Frontal portion of Occipito-Frontalis Muscle.
2. Temporal Muscle.
3. Orbicularis Palpebrarum Muscle.
4. Compressor Nasi Muscle.
5. Orbicularis Oris Muscle.
6. Buccinator Muscle.
7. Zygomaticus Muscle.
8. Depressor Labii Inferioris Muscle.
9. Platysma Myoides Muscle.
10. Sterno-Cleido-Mastoid Muscle.
11. Sterno-Hyoid Muscle.
12. Scalenus Muscle.
13. Subclavius Muscle.
14. Pectoralis Major Muscle.
15. Pectoralis Minor Muscle.
16. Intercostal Muscle.
17. Serratus Magnus Muscle.
18. Deltoid Muscle.
19. Biceps Muscle.
20. Pronator Radii Teres Muscle.
21. Supinator Longus Muscle.
22. Flexor Carpi Radialis Muscle.
23. Flexor Sublimis Digitorum Muscle.
24. Palmaris Longus Muscle.
25. Flexor Profundus Digitorum Muscle.
26. Anterior Annular Ligament.
27. Abductor Pollicis Muscle.
28. Flexor Brevis Pollicis Muscle.
29. Tendons of Flexor Muscle.
30. Lumbricales Muscles.
31. Rectus Abdominis Muscle.
32. Internal Oblique Muscle.
33. Psoas Magnus Muscle.
34. Tensor Vagine Femoris Muscle.
35. Sartorius Muscle.
36. Adductor Longus Muscle.
37. Rectus Femoris Muscle.
38. Vastus Externus Muscle.
39. Vastus Internus Muscle.
40. Crureus Muscle.
41. Gracilis Muscle.
42. Tendon of the Quadriceps Extensor Muscles.
43. Tendon of the Sartorius Muscle.
44. Tibialis Anticus Muscle.
45. Extensor Longus Digitorum Muscle.
46. Peroneus Tertius Muscle.
47. Gastrocnemius Muscle.
48. Annular Ligament.
49. Extensor Tendon of the Toes.



finger. The digits are provided with three phalanges each, except the thumb, which has only two. The thumb, however, has the advantage of moving freely on the carpus by means of a saddle-joint. The other carpal and metacarpal bones play slightly upon their fellows by means of gliding joints.

The pelvic girdle comprises the innominate bones, immovably united to the sacrum, posteriorly, by strong ligaments, and joined anteriorly in the median line. The innominate bone is composed of three bones (ilium, ischium, os pubis) which unite in adult life along a Y shaped line located in the cup of the hip-joint. Superiorly the *ilium* spreads out a broad concave surface, in which the intestines are supported; anteriorly the pubic bones reach the median line, beneath which are suspended the external genito-urinary organs; inferiorly the *ischium*, or haunch bone, forms the projection of the buttock and supports the body while sitting. Between the *pubis* and *ischium* is found the *obturator foramen*. This foramen is closed by the obturator membrane. The pelvis (or basin) furnishes the bony support upon which rest the contents of the abdomen, and is traversed by the outlets of the intestinal, genital, and urinary passages. The broad, expanded portion above is called the false pelvis, and is part of the abdomen; the narrow, funnel-like portion below is the true pelvis, and contains the rectum, uterus, and bladder. The pelvis of the woman is broader and much more roomy than that of the man. The lower extremities (the bones of which are thirty in number) join the innominate bones in the hip-joints. This articulation is a perfect example of the ball and socket joint, the globular head of the femur fitting into the cup above mentioned. In addition to the supports afforded by a strong capsular ligament, by an additional rim of fibro-cartilage deepening the bony cup, by great muscles constantly drawing the cup and head together, and by atmospheric pressure resisting the separation of the two joint elements, there is also a round ligament found within the joint, uniting the femoral head to a depression in the bottom of the cup. The femur is the bone of the thigh, and is the longest bone in the human body. Unlike even most of the higher primates, the femur of man is longer than the tibia. We recognize a head, neck, angle, and trochanters (great and small) at the upper end of the shaft. At the lower end are two condyles (external and internal) articulating with the tibia and patella in the knee joint. The patella or kneecap is a sesamoid bone, placed in the tendon of the great quadriceps extensor muscle, at the point where the tendon glides over the external surface of the femur. The knee-joint is a compound articulation formed by a fusion of the femoro-patellar joint, with the two joints lying between the outer and inner condyles of the femur and the corresponding tuberosities of the tibia. Between the surfaces of the two latter joints are interposed two semilunar fibro-cartilages, and partly separating the mesial from the lateral joint are two crucial liga-

ments. A single synovial membrane is common to all three joints. The femoro-patellar is a gliding joint; the femoro-tibial is a hinge-joint, although the surfaces also glide and rotate. The leg contains two bones, tibia and fibula. The tibia or shin-bone is the heaviest bone of the leg, is internal and anterior to the fibula, is the only leg bone to articulate with the femur, and transmits the weight of the body to the tarsus. On the upper extremity are two tuberosities with concave surfaces for articulation with the femoral condyles, and between them a spine to which attach the crucial ligaments and the semilunar fibro-cartilages. In front is a tubercle for the tibial attachment of the patellar tendon. At the lower extremity is a horizontal, smooth surface for the astragalus, and projecting still lower on the inner side is the inner malleolus. The upper part of the astragalus is mortised into a three-sided space, open in front and behind, bounded above by the smooth surface just mentioned, internally by the inner malleolus, and externally by the outer malleolus or lower extremity of the fibula. The ankle is, therefore, a true ginglymus or hinge-joint allowing motion only in an antero-posterior direction. The fibula is a slender bone located on the outside of the leg, covered entirely by muscles except at its upper and lower extremities, articulating above and below with the tibia, and articulating with the astragalus as the outer malleolus.

The foot is made up of a series of bones arranged in three groups: tarsus, comprising astragalus, os calcis, scaphoid, three cuneiform bones, cuboid; metatarsus, made up of five metatarsal bones; and five digits, in each of which are found three phalangeal bones except in the series attached to the great toe, which contains only two. The foot bones are grouped into arches supporting the weight of the body at the ankle joint through the medium of the astragalus. On the outside of the foot is an arch reaching from the os calcis to the fifth metatarsal bone and including the cuboid. On the inside of the foot is another arch comprising the os calcis, astragalus, scaphoid, internal cuneiform, and first metatarsal bones. In the crown of these two arches, fitting in like a keystone, is found the larger part of the astragalus, transmitting the weight of the body to the underlying foot. A third arch or dome is formed from side to side in the region of the ball of the foot by the five metatarsal bones, while the foot and leg are bound together by a series of ligaments admitting of motion only in an antero-posterior direction, the more complicated motions observed in the foot take place by gliding joints located between the tarsal bones.

The Muscular System.—The motive power by which the organism effects changes of position is furnished through the muscular system. Muscles are of two kinds: striped or voluntary, and unstriped or involuntary. For the anatomy of each, see *Histology*. Involuntary muscle occurs in the digestive tube, bladder, uterus, and is considered under those organs. We shall consider here those groups of striped

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muscles by which voluntary motion is effected. Contractility is the essential property of muscle fiber. It is further essential to muscular action that the muscle acting shall be attached with reasonable firmness to the two or more points acted upon. These two points are called *Origin* and *Insertion*, the former term denoting the point which, for the time, remains stationary, the latter designating the point yielding to the pull. It should be noted, however, that all muscles attached at both ends to bone may take their base or origin to either extremity and pull toward the other end. Other muscles are attached at one end only to bone, the other end being attached to soft parts and invariably draw those parts toward the bone. Thus, the facial muscles draw the skin in various directions toward the skull. Muscles attached at both ends to bone furnish in almost all cases the power operating levers of any of the three classes. It is therefore a requisite that there shall intervene between the origin and insertion of these muscles, a joint, which shall be the balance upon which the fulcrum and the moving bone or lever are enabled to adjust the difference between power and load. In many cases, muscles skip one bone and two joints on their way from origin to insertion, and their action becomes thus compounded with the action of other muscles, which serve to steady the intervening bone, and enable the muscle to subserve two entirely different groups of motions. As muscles approach their terminal points, they become fibrous, the fibers grouping themselves into round cords or tendons, or flattening out into thin glistening sheets. We classify the muscles of the body broadly into a *Dorsal* and *Ventral* group, the former acting usually as extensors, the latter as flexors, but the body has experienced so many changes in process of development, that this classification will hardly hold. Nor can we adopt any very lucid system of classification at present for the trunk and head muscles, so varied is their function. We therefore group and name these latter according to anatomical position as much as possible. In the extremities we distinguish the following groups of muscles: flexors, extensors, pronators (action illustrated by laying hand on table with palm down), supinators (palm up), adductors and abductors (drawing to or from the median line of the body), external and internal rotators (of arm and thigh).

Following are the principal divisions of the muscular system of the human body: between spine and upper limb, posteriorly; between ribs and upper limb, anteriorly; between shoulder girdle and humerus; between shoulder, arm, and forearm (flexors and extensors); pronators and flexors of forearm, hand, and fingers (ulnar side); supinators and extensors of forearm, hand, and fingers (radial side); muscles of the palm of the hand; muscles of the thumb; muscles of the little finger; between spine or pelvis, and femur; thigh to leg; thigh to leg or heel (flexors); leg to foot (flexor); leg to foot (abductors and extensors);

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dorsum of foot; plantar surface of foot; great and little toe muscles; muscles of scalp; muscles of orbit and eye; muscles of expression, in addition to the muscles of mastication; muscles of the palate; muscles of the tongue; muscles of the pharynx and larynx; muscles of head, neck, and trunk (lateral to spine, posterior to spine); muscles of thorax (respiratory); muscles of the abdomen (support, respiration, draw thorax to either side or forward); and muscles of pelvic outlets.

In connection with the muscular system we note a series of broad sheets of fibrous and connective tissue surrounding and separating the layers of muscles from one another, and defining the various regions of the body. These sheets of membrane become in many cases of vast importance to the surgeon, since within their meshes are contained usually the great nerves or blood-vessels of the body on the way from region to region; thus, the deep cervical fascia not only binds the muscles and other organs together, but passes with the trachea and œsophagus as well as the large vessels and nerves downward into the thorax and continues there to bind these structures to the heart, lungs, and pericardium. In many cases also the fascias, by virtue of their excessive thickness and firmness serve to support the contour of the limbs. Again, we find the more superficial fascias giving off thick, fibrous sheets, which pass to the bone between the anterior and posterior muscles of the limb. Other fascias occur as membranes lying between the parallel bones of arm and leg, and are there designated as interosseous membranes.

Circulatory System.—The circulatory system consists of a double pump connected with a series of tubes, propelling and conveying blood (see *Histology*), through the medium of which the tissues are nourished and oxygenated, and by which waste products are carried from the tissues to the excretory organs. Under Circulatory System we consider *Heart*, *Arteries*, *Veins*, and *Lymphatics*.

The *Heart* is a conical organ, located centrally in the thoracic cavity with the base directed upward and backward, the apex directed forward and to the left, and is surrounded by a serous sac called the *pericardium* within which it moves freely, except at the base where the sac is pierced by the aorta, venæ cavæ, and pulmonary vessels. Each half of the pump comprises a receiving chamber or auricle, and a propelling chamber or ventricle. These two pumps, pulmonary and systemic, are situated, the one on the right and the other on the left side of the heart; although in the development of the body the right side has come to lie more anteriorly. The right side of the heart receives venous or impure blood. This blood, received first into the auricle, is propelled through the tricuspid valves into the ventricle and passes thence through three pulmonary semilunar valves into the pulmonary artery and the lungs. Having become oxygenated in the lung, the pure blood is returned to the left auricle by pulmonary veins. A pair of mitral valves

directs the blood current into the left ventricle and prevents its return to the auricle. The thick, muscular walls of the left ventricle propel the blood still farther through three semilunar or aortic valves into the aorta. The muscle of which the heart is composed, while involuntary in its action, possesses many of the histological properties of striped muscle fiber, disclosing the striated appearance of the latter, but also showing an intricate system of communication between fiber and fiber never found in voluntary muscles.

Arteries.—In the middle coat of the arteries into which the blood is propelled by the heart, is found the homologue of the heart muscle existing as a series of circular unstriped muscle fibers. These fibers in all probability furnish the basis from which the heart muscle was developed, for while the fibers lack the stripes of voluntary muscles, they possess the intricate interlacing arrangement, and the elongated nuclei, of the heart muscle. We distinguish in the artery three coats or tunics; the internal coat, made up of a basement membrane supporting a layer of shining, flat, epithelial cells along which the blood current can glide smoothly; the middle coat, containing the circular muscle above mentioned; and the external coat, made up of interlacing fibers and connective tissue, passing gradually into the fascia usually found surrounding a blood-vessel. In the aorta are found very few of the muscle cells, but these are replaced by numerous fibers of yellow elastic tissue.

Branching of Arteries.—The arterial blood, propelled through the ascending aorta, is carried to the aortic arch, situated at the root of the neck in front of the trachea and œsophagus. From the arch of the aorta are given off in order the innominate artery, dividing into right carotid and subclavian, and left carotid and subclavian vessels. The common carotid arteries take an upward course from the neck to the head, giving off no branches until they divide into external and internal carotids. The external carotid gives off many branches supplying the upper part of the neck and superficial portions of the head (superior thyroid, lingual, facial, occipital, temporal, and internal maxillary); the internal carotid artery supplies the brain and orbit, giving off cerebral and ophthalmic branches. The subclavian artery ascends for a short distance into the neck behind the clavicle, arching over the first rib, and giving off a vertebral artery ascending into the skull to join the posterior branches of the internal carotid. Other branches of the subclavian pass to the neck and inner wall of the chest. The subclavian artery, passing into the region of the shoulder behind the clavicle, becomes the axillary space, or armpit, and the inner aspect of the arm. At the front of the elbow, the brachial artery divides into radial and ulnar, which pass down the outer and inner side of the front of the forearm. These two arteries in the palm of the hand unite as superficial and deep palmar arches. The palmar arches furnish the most perfect examples of the interlacing and union of arte-

rial branches to be found in the body. By means of interlacing, the system is enabled to correct temporary inequalities in the circulation of any given part; for when through any cause, let us say, the radial artery is obstructed, the blood is enabled to reach the palmar arches by way of the ulnar channel. The arch of the aorta is continued downward along the front of the thoracic spine as the descending thoracic aorta, giving off in this region the intercostal arteries. Perforating the diaphragm, the thoracic becomes the abdominal aorta, and gives off the celiac axis supplying the liver, stomach, spleen, and upper bowels; the inferior-mesenteric supplying the lower bowels; renal arteries supplying the kidneys; spermatic arteries supplying the ovaries or testicles, and certain small arteries supplying the muscles of the loin. Over the fourth lumbar vertebra the aorta divides into right and left common iliac arteries, supplying the lower extremities and the pelvic organs. Each common iliac divides presently into external and internal iliac branches; the latter passing deeply into the pelvis to supply the bladder, rectum, and structures of the pelvic outlet, including the gluteal region, or buttock, and the sciatic nerve. The blood reaches the lower extremity through the external iliac vessel, entering the anterior aspect of the thigh underneath Poupart's ligament, at which point the iliac becomes the common femoral artery. A common femoral artery passing down the anterior aspect of the thigh, presently gives off a deep femoral artery to supply the deeper structures of this region. The superficial femoral, the main trunk, winds around the inner aspect of the thigh from front to back until it comes to lie behind the knee-joint. About two inches below the knee-joint this artery divides into anterior and posterior tibial arteries; the anterior tibial passing above the interosseus membrane and to the front of the leg and foot; the posterior tibial continuing down the posterior aspect of the leg, under the calf muscles, to a point behind the inner malleolus, where it enters the sole of the foot as the external and internal plantar arteries.

Capillaries.—The arteries terminate in a fine network of blood-vessels, in which we find remaining only the internal coat of the artery, and, in some cases, only the epithelial portion of that coat. The blood, on reaching the capillaries, allows its liquid constituents and a few of the white corpuscles to escape through spaces between epithelial cells. These liquid constituents are presently collected again, after parting with their nutriment and taking up waste products from the tissues, into lymphatic vessels, which are found as delicate networks and spaces throughout the body. At certain points in this lymphatic network are located lymphatic glands, which serve as strainers to prevent the re-entrance of poisonous or foreign material into the system; thus, in the groin, in the axillary space, in the neck, in the abdominal and thoracic cavities are located groups of these lymphatics, which are inconspicuous in

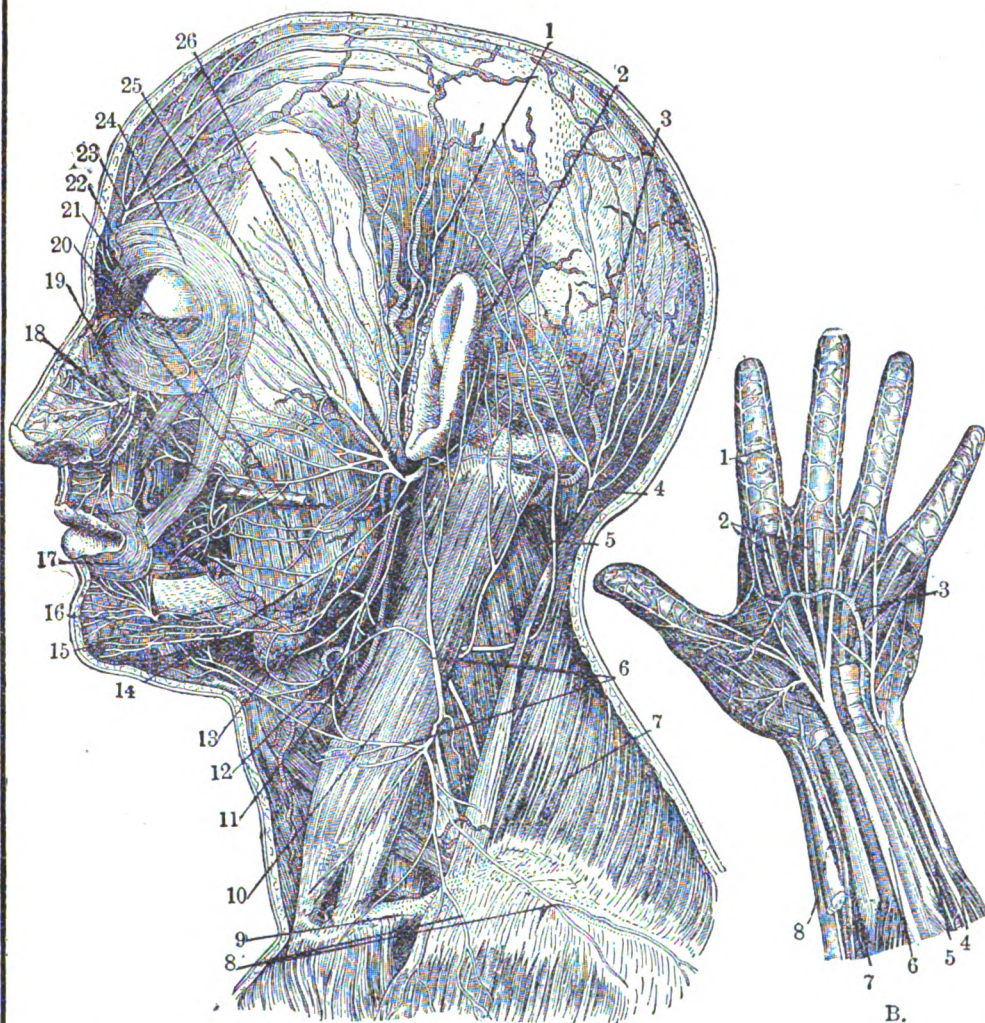
health, but in disease become enlarged and inflamed in the effort to dispose of dangerous material. The larger portion of the lymphatic fluid, however, is collected into small channels, of which the thoracic duct is the largest, and reaches the general circulation again through the veins of the neck.

Veins.—The corpuscular elements of the blood do not leave the capillaries, but are collected into vessels of gradually increasing size known as veins. Veins differ from arteries in the thinness of their walls, in the presence of valves, and in the fact that they carry blood in which the oxygen has been replaced by carbon-dioxide. The thinness of the veins is due to the fact that the middle coat, which in the artery contains circular, muscular, and elastic fibers, is almost entirely absent, so the vein lacks not only the property of contractility found in the artery, but is so inelastic that its walls collapse immediately when emptied of blood. Veins follow the same course as arteries, and as a rule receive the same names. In the lower extremity, however, we find two superficial veins. In the upper extremity the superficial veins are known as *cephalic* and *basilic*. It is from the latter vein that the blood is taken in the operation of blood-letting. Within the skull the venous blood is accumulated into great channels lying within the dura mater, and in the neck the large venous channels are known as external and internal jugular veins. The jugular and subclavian veins from either side of the body unite into right and left innominate veins, which pour the blood into the descending vena cava. The blood from the lower part of the body is collected into the ascending vena cava. It is to be noted, however, that the venous blood from the stomach and intestines, is collected into the large portal vein, and through this vein is carried a second time to capillaries located in the liver, from which an hepatic vein carries it into the ascending vena cava. The course taken by the venous blood from the stomach, intestines, and liver to the vena cava is known as the *Portal Circulation*.

Nervous System.—Within the bony arches, which, we have said, are thrown backward from the bodies of the vertebrae as well as from that cranio-facial axis of the skull which is supposed to correspond in some measure to the vertebral bodies, is a neural canal, so-called because it contains the larger portion of the *central nervous system*. We divide this system into two portions, the one contained within the neural canal, comprising the brain and spinal cord, and known as the *cerebro-spinal axis*; the other made up of nerve fibers passing to and from this axis, lying external to the neural canal, and called *peripheral nerves*. In addition to these two sets of nerve structures, classed together as the cerebro-spinal nervous system, the body is served also by a group of nerves made up of conducting fibers, and central cells collected into ganglia at various points, and called the *sympathetic nervous system*. This latter system appears to control the purely

vegetative functions of the body, such for instance as digestion, nutrition, elimination, etc. The cerebro-spinal system controls actions of which the brain or the individual is cognizant. The functions in which the central nervous system takes part, may be divided into those (a) in which sensation and its modifications are the essential features, represented by a series of fibers passing toward the central nervous system and known as *afferent* nerves; and (b) motor impulses, or their modifications, represented by a series of fibers passing from the central nervous system, known as *efferent* nerves. In addition to these peripheral trunks, made of white nerve fibers, or axis cylinders, many of which are contained not only in the peripheral nerves, but within the substance of the spinal cord, and pass upward as far as the gray matter of the brain, the nervous system contains many cells constituting the gray substance, distinctly central in their character, within which the impulses conveyed to and from the periphery are elaborated. These cells are the essential features of the central nervous system, and all fibers passing thereto, whether located in the brain, spinal cord, or in the properly so called peripheral nerves, are distinctly peripheral. See *Histology*.

Peripheral Nerves.—Springing from the central nervous system and passing symmetrically to either side of the body, are forty-three pairs of peripheral nerves, some of which contain purely afferent or sensory fibers, some contain efferent or motor fibers, and some are called mixed nerves because they contain both motor and sensory tracts. There are forty-three of these paired nerve trunks, and it is supposed that they indicate, in some manner, an arrangement of the body into segments corresponding, at least in the trunk, to each pair of supplying nerves. Thirty-one pairs spring from the spinal portion of the neural axis and are classed as *spinal nerves*; twelve pairs spring from the brain, and passing out through openings in the cranium are called *cranial nerves*. Of the twelve cranial nerves we note the following points: 1, Olfactory nerve, an efferent nerve supplying the special sense of smell, arising from the olfactory lobe of the brain, emerging from the skull through a series of small openings in the ethmoid (or sieve) bone, and distributing its filaments over the mucous membrane of the upper part of the nose. 2, Optic nerve, a sensory nerve supplying the retina, or organ of vision, arising from the optic thalamus on either side, crossing to the opposite side, interlacing with the fibers of the opposite nerve, and emerging from the cranial cavity through the optic foramen, enters the orbit and terminates in the back part of the eyeball. 3, Motor oculi, or third nerve, a nerve of motion, arising from the inner side of the crus cerebri, passing into the back part of the orbit to all the muscles of the eyeball except the external rectus and superior oblique. 4, The Patheticus or trochlear nerve, arising from the base of the brain near the origin of the preceding nerve, and supplying the superior

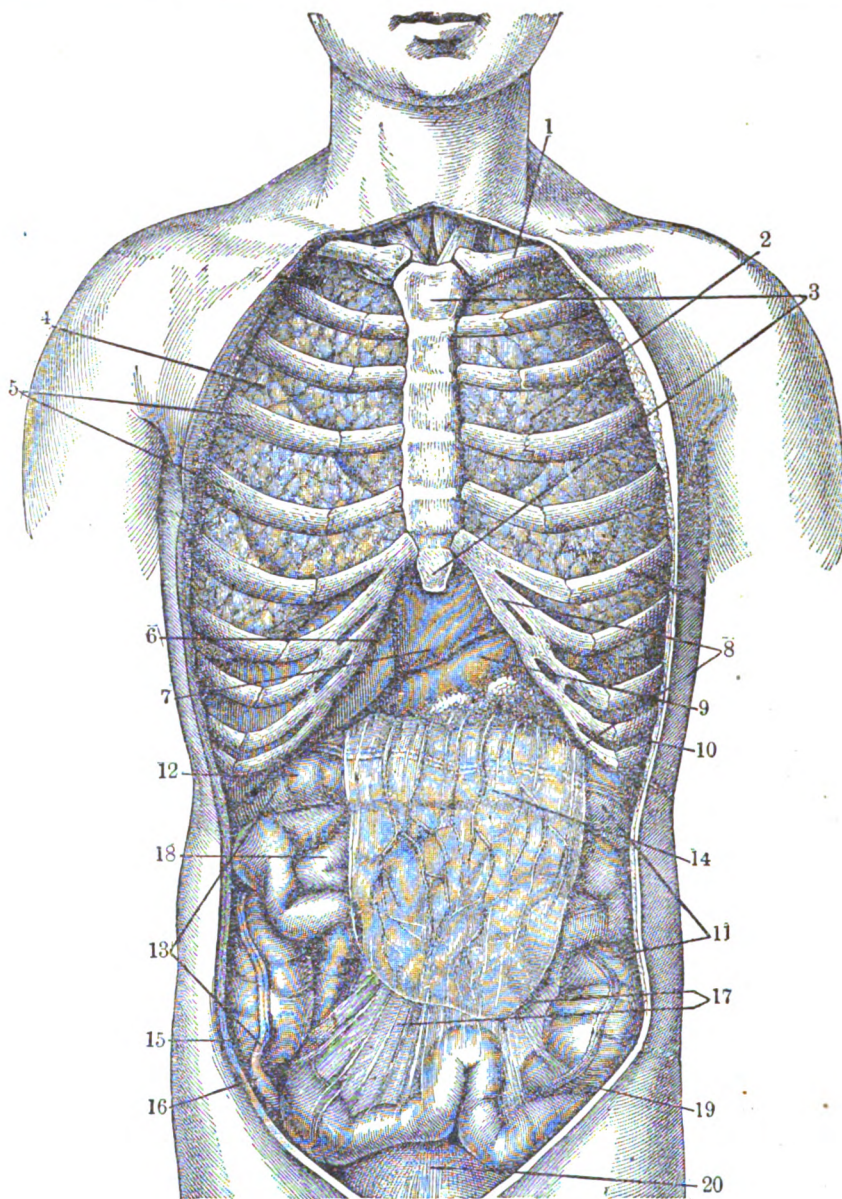


A.

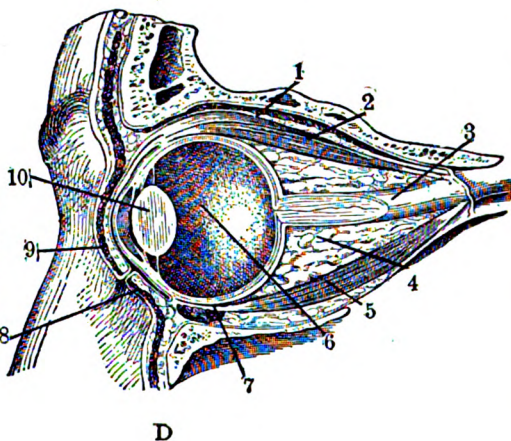
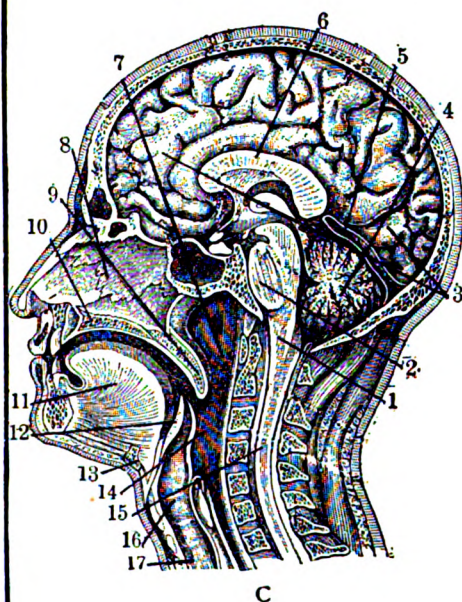
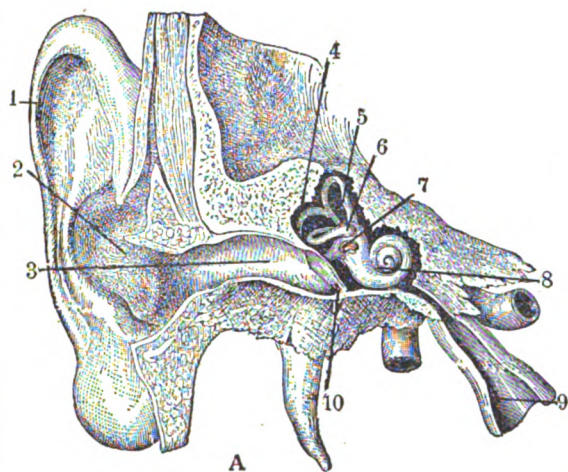
A. SUPERFICIAL ARTERIES AND NERVES OF THE FACE AND NECK. 1. Temporal artery. 2. Artery behind the ear. 3. Occipital artery. 4. Greater occipital nerve. 5. Smaller occipital nerve. 6. Nerve of the neck. 7. Trapezius muscle. 8. Clavicular nerves. 9. Clavicle. 10. Sterno-Cleido-Mastoid muscle. 11. Outer artery of the head. 12. Inner artery of the head. 13. Salivary gland. 14. Nerves of the lower jaw. 15. Outer maxillary artery. 16. Nerve of the chin. 17. Circular muscle of the mouth. 18. Greater yoke muscle. 19. Nerves below the eye. 20. Masseter or chewing muscle. 21. Ear passage. 22. Arteries of forehead. 23. Nerves of the forehead. 24. Eye closing muscle. 25. Facial artery. 26. Facial nerve.

B.

B. NERVES OF THE HAND. 1. Nerves of the skin. 2. Tendons. 3. Arteries of the palm of the hand. 4. Elbow nerve. 5. Elbow artery. 6. Nerve of the forearm. 7. Nerve of the under-arm. 8. Artery of the underarm.



INTERNAL ANATOMY. 1. Collar-bone. 2. Left lung. 3. Breast bone. 4. Right lung. 5. Ribs. 6. Right lobe of the liver. 7. Left lobe of the liver. 8. Cartilage. 9. Stomach. 10. Spleen. 11. Descending colon. 12. Transverse colon. 13. Ascending colon. 14. Omentum. 15. Coecum. 16. Vermiform appendix. 17. Mesentery. 18. Small intestines. 19. Sigmoid flexure. 20. Bladder.



A. SECTION THROUGH THE RIGHT EAR. 1. Helix. 2. Concha. 3. Outer passage. 4, 5, 6. Semicircular canals. 7. Oval window. 8. Cochlea. 9. Eustachian tube. 10. Ear drum. B. BRAIN FROM ABOVE. C. SECTION THROUGH HEAD AND NECK ON THE MEDIAN LINE.

1. Medulla oblongata. 2. Pons. 3. Right lobe of the cerebrum. 4. Cerebellum in section. 5. Blood vessel. 6. Corpus striatum. 7. Nasal passage. 8. Nasal bone. 9. Soft palate. 10. Hard palate. 11. Tongue. 12. Epiglottis. 13. Os hyoides. 14. Oesophagus. 15. Spinal cord. 16. Larynx. 17. Windpipe. D. SECTION THROUGH THE CLOSED LEFT EYE. 1. Lifting muscle. 2. Upper straight muscle. 3. Optic nerve. 4. Fatty cushion. 5. Lower straight muscle. 6. Vitreous humor. 7. Lower cross muscle. 8. Lower eyelid. 9. Upper eyelid. 10. Crystalline lens.

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oblique muscle of the eyeball. 5, A mixed nerve, dividing before emerging from the cranial cavity into three branches, hence called trifacial or trigeminal nerve. The upper branch supplies the region of the orbit and forehead, the middle branch supplies the region of the nose and the upper jaw and teeth, and the lower branch supplies the lower jaw and the teeth contained within it, also carrying the fibers of the gustatory nerve to the tongue. The lower branch also contains the only fibers of the fifth nerve which are motor in their function. 6, Abducens oculi, a nerve of motion, supplying the external rectus muscle of the eye. 7, Facial nerve, a motor nerve presiding over the muscles of the face, arises from the side of the medulla oblongata near the fourth ventricle, becomes very intimately associated with the eighth nerve in the petrous portion of the temporal bone, and presently leaving that nerve, emerges on the face at the base of the temporal bone. On the face, this nerve divides within the substance of the parotid gland into many branches, supplying the muscles of the ear, the muscles of the eyelid, of the nose, mouth, and a few of the muscles of the neck. 8, Auditory nerve, an afferent nerve carrying fibers from the ear, or auditory organ, arises from the medulla, and is distributed to the organ of hearing. 9, Glosso-pharyngeal, a mixed nerve containing sensory fibers (probably of taste) from the tongue, and carrying motor fibers (probably) to the pharynx. These fibers originate in the medulla near the fourth ventricle, and pass out through the jugular foramen, together with the tenth and eleventh nerves, between the branches of the internal jugular vein. This nerve lies very deeply in the back part of the throat under cover of the parotid gland, and sends branches to the pharyngeal muscles and the posterior half of the tongue. 10, Pneumo-gastric nerve, or vagus, so called from its extensive distribution to the lungs, heart, and stomach; arises within the medulla, emerges from the cranial cavity with the ninth and eleventh nerve through the jugular foramen, passes very deeply into the neck, and lies closely associated with the carotid vessels. In the neck, it is probable that this nerve sends out a number of branches to the pharyngeal muscles. It sends branches also to the muscles of the larynx. Very slightly diminished in size, it passes from the neck into the chest, and there supplies numerous branches to the heart and root of the lung. The nerve then leaves the chest in company with the œsophagus and supplies branches to both sides of the stomach. It will thus be seen that this nerve supplies the pharynx, larynx, trachea, lungs, heart, œsophagus, and stomach. 11, Spinal accessory nerve is a nerve containing many motor fibers, and (probably) a few sensory fibers. Portions of this nerve pass to the muscles of the pharynx by way of fibers which enter the pneumogastric nerve; the main trunk of the nerve passes backward in the neck to supply the trapezius and sterno-mastoid. 12, Hypoglossal nerve,

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a nerve of motion supplying the depressors and elevators of the hyoid bone, and many of the muscles of the tongue, arises in the medulla and emerges from the skull through the anterior condyloid foramen. This nerve has a somewhat superficial course in the neck, lying at one point upon the external carotid artery, and there dividing, sends one set of fibers to the depressors of the hyoid bone, and another set directly forward to the elevators of the hyoid bone and the muscles of the tongue.

Spinal Nerves.—Springing from the side of the spinal cord are thirty-one pairs of nerves, of which we find eight in the cervical region, twelve in the thoracic, five in the lumbar, five in the sacral, and one in the coccygeal region. Each nerve springs from the cord by two roots, a posterior, made up of afferent fibers, and an anterior, carrying motor fibers. On the posterior root is found a ganglionic enlargement. The fibers from the two roots uniting, emerge through intervertebral foramina and divide externally to the spine into anterior and posterior divisions, each containing both motor and sensory fibers. The dorsal divisions of the spinal nerves are small, do not join one another into important plexuses, and their distribution is, in a great measure, limited to corresponding segments of the muscles of the back and overlying skin. The anterior divisions of the spinal nerves are large and important, especially in the cervical, lumbar, and sacral regions. In the thoracic region the anterior divisions of the spinal nerves pass forward between the ribs, preserving in a great measure the undisguisedly segmental character of that region. In the other regions, however, the anterior nerves on emerging from the spinal column, blend immediately into great plexuses made up of interlacing fibers of the adjacent spinal nerves. We distinguish the following plexuses formed from the anterior primary divisions of spinal nerves: 1, a cervical plexus made up of the first four cervical nerves, and supplying the muscles and skin of the neck; 2, a brachial plexus made up of the anterior divisions of the lower four cervical nerves, and a large part of the first dorsal nerve. These nerves unite into three cords, which surround the axillary artery and presently divide into branches supplying the shoulder and upper extremity. They also supply the neck, superficial portions of the chest, the arm, and forearm. The muscles of the back of the arm are supplied by a great nerve which winds around the back of the humerus, presently emerging near the elbow on the interior and external portion of the forearm. The greater number of the muscles in the palm of the hand are supplied through the ulnar nerve, which, coursing down the inner side of the arm and forearm, supplies two of the forearm muscles with motion, and supplies sensation to the remainder of the palmar aspect of the hand. 3, The lumbar plexus is made up of the anterior division of the first four lumbar nerves, supplying motion and sensation to the muscles and skin of the abdomen and the anterior aspect of the thigh. 4, Sacral plexus is made up of portions of the

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fourth and fifth lumbar nerves, and the first, second, and third, with a portion of the fourth sacral nerves. This plexus supplies motion and sensation to the pelvic outlet, to the posterior aspect of the thigh, to the buttock, and to the leg and foot with the exception of that portion of the skin which is supplied with sensation through the internal saphenous nerve.

Sympathetic Nervous System.—The sympathetic system comprises two gangliated cords lying on either side of the vertebral column throughout the trunk. In the thoracic region there are twelve ganglia on each side; in the cervical region there are but three; in the lumbar and sacral regions there are eight or nine, and the system terminates in a median ganglion located on the front of the coccyx. These ganglia are connected with one another by communicating fibers and are also connected with the anterior divisions of the spinal nerves. In addition to the function of visceral control already mentioned, this system governs the blood-vessels by means of vaso-motor fibers, and sends other fibers also to the heart (increasing usually the pulsations of this organ), so that the sympathetic nervous system may be considered to regulate the action of the unstriated muscle fiber throughout the body, as well as the action of glandular organs. In addition to what may be called the central portion of the sympathetic nervous system, networks of communicating fibers surround all the large blood-vessels, governing their action and communicating with the cerebro-spinal nerves located in the vicinity. Branches from the three cervical ganglia surround the carotid artery and descend as cardiac branches into the thorax to the heart, apparently exercising an action antagonistic to the cardiac branches of the pneumogastric nerve. From the thoracic portion of the sympathetic system, branches pass downward through the diaphragm into the abdomen. These nerves communicate with a solar or epigastric plexus resting upon the abdominal aorta, and govern the action of the digestive system. Fibers radiate from the semilunar ganglia and solar plexus in the direction of plexuses located on the various abdominal organs; thus we find diaphragmatic, supra-renal, renal, coeliac, hepatic, coronary, splenic, mesenteric, spermatic, ovarian, hemorrhoidal, vesical, prostatic, cavernous, vaginal, and uterine plexuses, governing the nutrition, blood supply, and vegetative life of the various organs. In addition to these ganglia found in the sympathetic cord, and to be considered as belonging exclusively to that system, there are a number of enlargements found on the spinal and cranial nerves, which contain gray cells and appear to be capable of functioning up to a certain point, as a part of the central nervous system—probably governing local reflex actions. Into some of these ganglia we find three kinds of nerve fibers passing, motor, sensory, and sympathetic, from adjacent trunks. The cerebro-spinal axis is made up of the brain and spinal cord enclosed within three membranes, *dura mater*,

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arachnoid, and *pia mater*. Of these membranes, the *dura mater*, tough and fibrous, is the most superficial and separates the nervous axis from the overlying bone. At certain points within the skull the *dura mater* is reflected away from the bone and comes to lie between portions of the brain. The *dura mater* of the cranium is adherent to the skull and serves as the periosteum; in the spinal canal, however, the *dura mater* takes only an occasional attachment to adjacent vertebrae by way of support. Beneath the *dura mater* is found the second membrane, or *arachnoid mater*, from which is secreted the watery cerebro-spinal fluid found on penetrating the *dura mater*. Beneath the *arachnoid* is found the third covering of the cerebro-spinal axis, the *pia mater*, which supports the blood-vessels supplying the brain and cord, and consists of a very delicate network of white fibrous tissue from which the vessels pass into the nerve tissue. At certain points where ventricles or cavities exist in the cerebral structure, the *pia mater* becomes fringed.

Spinal Cord.—The spinal cord is that portion of the cerebro-spinal axis lying within the spinal column, but is continuous into that portion of the brain called *medulla oblongata* without any line of separation. From its commencement at the foramen magnum to its termination near the first lumbar vertebra, it is about seventeen inches in length, and terminates in a bundle of nerve fibers, which pass to the lower end of the sacrum within the spinal canal. The human spinal cord is about eight millimeters in diameter, but there are enlargements in the cervical and lumbar regions corresponding to the points at which the brachial and lumbar plexuses are given off. The cord is traversed from one end to the other by two deeper fissures, anterior and posterior median, which lie in the median line of the cord in an antero-posterior plane. The substance of the cord comprises gray and white nerve matter. The gray substance is composed largely of nerve cells lying in the interior, and having roughly the appearance of the letter *H*; the white substance, made up entirely of conducting fibers running in a direction parallel to the long axis and filling in the contour of the cord, is poured in, as it were, around the outside of the *H*, or gray substance. Between the two lateral halves of the cord, at a point where the anterior and posterior median fissures do not meet, are found two series of transverse fiber called *commissures*, connecting the lateral halves of the gray and white substance respectively. Microscopical and experimental investigation has shown that the white substance, apparently homogeneous, is made up of definitely grouped collections or columns of nerve fibers passing upward to the brain from the periphery, or downward to the periphery from the brain. Investigation also shows that the gray substance is made up largely of tracts and groups of nerve cells controlling certain automatic functions of the body which are not directly dependent on cerebral control.

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The *brain* comprises that portion of the nervous system contained within the cranial cavity, with the exception of such portions of the twelve cranial nerves as lie between the brain and their foramina of exit. The human brain is larger and heavier, not only in proportion to the weight of the body, but in actual mass, than that of any other animal except the elephant and some of the whales. The average male European brain weighs about 50 oz., that of the female about 45 oz. Since the height and weight of the average woman is about eight per cent. less than that of the average man, it appears to be a fact that the average female is possessed of a smaller brain capacity than the average man. In the infant at birth the brain weighs about 10 oz. and continues to increase in size until about the eighth year. The weight, however, increases until middle life. The largest brain is said to have been that of Cuvier, about 64 oz. The smallest brain of an intelligent individual weighs about 35 oz. Among idiots, however, brains have been found with a weight as low as $8\frac{1}{2}$ oz., and, on the other hand, the brain of an idiot has been observed to weigh as much as 60 oz. Among the lower races of mankind, the average weight is distinctly lower, ranging in males from 45 to 42 oz. It may be remarked in passing that the weight of the brain of the gorilla is about 30 oz. The brain is composed of the *Cerebrum*, *Cerebellum*, *Pons Varolii*, and *Medulla Oblongata*.

The *Medulla Oblongata* is that portion of the brain lying most inferiorly, continuous at the foramen magnum with the spinal cord and joined above with the cerebellum and cerebrum by fibers contained in the inferior crura cerebelli and pons varolii. It is pyramidal in shape, about an inch long, and rests upon the basilar process of the occipital bone. It is in reality simply the expanded upper portion of the spinal cord, but containing more numerous and more important centers and groups of nerve cells than are contained in the cord proper; thus, many of the motor and sensory cranial nerves have their points of origin buried deeply in the substance of the medulla. The centers governing respiration, the action of the heart and blood-vessels, and many of the functions of digestion, secretion, and nutrition, are found in the medulla. The intimate structure of the medulla is composed of a series of white columns, continuous with the columns of the cord below, and with the pons varolii and peduncles of the cerebellum above. In the median line anteriorly are found sets of fibers passing from one side to the other in what is known as the pyramid. Posteriorly, ascending fibers pass upward from what is known as the restiform body, and, diverging to enclose the fourth ventricle, terminate in the cerebellum, constituting the inferior peduncles of that body. The point at which these fibers diverge is called the Calamus Scriptorius. In the lateral portion of the medulla are found white fibers in a lateral tract, continuous with the same tract of the cord, and an olivary body consisting of an oval mass of white fiber en-

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closing gray nerve cells. Other bundles of fibers continuous with corresponding bundles in the cord pass upward into the substance of the medulla; bound together by these bundles are the groups of nerve centers above mentioned, represented by gray nuclei. The H shaped arrangement of the gray matter in the cord is lost in the medulla, and gives place to gray nuclei located here and there among the white bundles.

Pons Varolii.—Above and interior to the medulla oblongata is the pons Varolii, made up almost entirely of white connecting fibers passing between various divisions of the brain. The pons is further situated between and anterior to the lobes of the cerebellum, with which it is connected by the middle peduncles of that structure. Within the pons are found alternating layers of transverse and longitudinal white fibers, the transverse fibers being continuous with the middle peduncle of the cerebellum, the longitudinal fibers are communicating tracts from the medulla, passing upward into the crura cerebri.

The *Cerebellum* is that portion of the brain which lies posteriorly to medulla and pons, and below the posterior lobes of the cerebrum in the inferior occipital fossæ. Separating the cerebrum from the cerebellum is the tentorium cerebelli, and between the two cerebellar lobes is located the falx cerebelli. The cerebellum weighs about one eighth as much as the cerebrum, but is larger in proportion in infants and the lower animals. The white matter of the cerebellum is located internally, the gray matter externally. The convolutions are very numerous and lie in narrow, transverse folds, separated by numerous deep fissures placed very closely together, and appear to possess very little of the distinctive character of the fissures and convolutions of the cerebral hemispheres. The cerebellum is divided into three large lobes, a middle and two lateral, the middle lobe being called the worm or vermis, and the two lateral lobes the hemispheres. These lobes cannot be separated from one another, so that the cerebellum may be described as two large lobes connected perpendicularly by a smaller median ridge, the ridge constituting the middle lobe or vermis. A median section of the cerebellum discloses the great depth of the cerebellar fissures. The surface of the fissures is composed entirely of gray matter, and running toward this from the interior of the cerebellum is the white substance, arranged in a branching manner and called therefore Arbor Vitæ. The fourth ventricle is a lozenge-shaped cavity located between the medulla and pons anteriorly, and the cerebellum posteriorly. The floor or anterior aspect of this ventricle is diamond shaped, formed by the posterior aspect of the medulla and pons. It is continuous below with the central canal of the spinal cord; above, it is continuous with the ventricles of the brain through the Sylvian aqueduct. The fourth ventricle is closed laterally by the points of contact between medulla, pons, and cerebellum. Within the fourth ventricle are

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located the gray nuclei before mentioned, of the fifth, sixth, seventh, eighth, ninth, tenth, and eleventh cranial nerves. Somewhat below the fourth ventricle is found the nucleus for the twelfth nerve, and somewhat above the ventricle, in the floor of the aqueduct of Sylvius, are found the nuclei for the third and fourth nerves.

The *Cerebrum* is the largest portion of the brain, is supported in the anterior and middle fossae of the skull, rests posteriorly on the tentorium cerebelli, and is covered above by the dome of the cranium. It is divided into lateral and symmetrical hemispheres, partly separated by the falx cerebri lying in the great longitudinal fissure, and joined more deeply by a great commissure or bridge passing across the median line, known as *Corpus Callosum*. The outer surface, composed entirely of gray matter, or cortex, is arranged into lobes and convolutions separated by fissures. The cortical layer, seen also in the ventricles, is composed of alternate strata of gray and white matter, the entire layer being about one-sixth of an inch thick. The true interior of the cerebrum is composed of white matter. Before describing the interior structure it is important to note the larger of the lobes and fissures. There are five great lobes, separated by fissures varying from half an inch to one inch in depth. The most important of the fissures are: Sylvian, running upward and outward along the outside of each hemisphere; the fissure of Rolando, commencing at a point a little behind and above the point of junction of the ascending and horizontal limbs of the fissure of Sylvius, and extending upward and backward to a point somewhat behind the parietal eminence; the parieto-occipital fissure, found still farther back. The five lobes of the cerebrum are as follows: frontal lobe, lying in front of the ascending limb of the fissure of Sylvius; parietal lobe, lying between the fissure of Rolando, the parieto-occipital fissure, and the horizontal part of the fissure of Sylvius; occipital lobe, constituting the posterior extremity of the hemisphere, and separated from the parietal lobe by the parieto-occipital fissure; temporo-sphenoidal lobe, in the middle fossa of the skull below and behind the horizontal limb of the fissure of Sylvius; central lobe, or Island of Reil, on the outer surface of the cerebrum, and not visible upon the convex surface. The lobes are divided into many convolutions and gyri by secondary fissures running into those already mentioned. The importance of a study of the convolutions is becoming increasingly obvious, for experimental science has demonstrated beyond question that the gray matter found in each convolution presides over some definite function or portion of the body; thus it is a fact not to be questioned, that certain convolutions in the frontal lobes control the function of speech, certain others control the motions of the head and extremities on the opposite side of the body. The lateral ventricles are lined by a thin serous membrane and contain a small amount of cerebro-spinal fluid.

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They are separated in the median line from one another by a thin partition, and each ventricle is divided into a body, and anterior, posterior, and middle cornua. Below the corpus callosum is a mass of white matter made up of longitudinal commissural fibers diverging in front and behind to form anterior and posterior pillars. Behind the anterior pillars of the fornix and below the body, is the foramen of Monro, connecting each lateral ventricle with the anterior part of the third ventricle. Passing through this foramen into the third ventricle and extending into either lateral ventricle, lying in what is known as the great transverse fissure of Bichat, is the velum interpositum, a process of pia mater from which originate the choroid plexuses of the third and lateral ventricles. The posterior boundary of the foramen of Monro is the optic thalami, two masses composed externally of white and internally of gray matter. The thalami form also the lateral boundaries of the third ventricle. The floor of the third ventricle is formed by the lamina cinerea, infundibulum, corpora albicantia, and posterior perforated space. Crossing the third ventricle are three sets of transverse fibers, *commissures*, joining the optic thalami. Directly behind the third ventricle, and in the Sylvian aqueduct, is the pineal gland, a small reddish body about the size of a split pea and containing a clear albuminous liquid and minute phosphatic calculi called brain sand. Above the Sylvian aqueduct and forming its roof are four bodies, ranged in pairs, known as *corpora quadrigemina*, masses of gray matter with a thin covering of white fibers. Resting against the back part of each thalamus and external to the corpora quadrigemina, are the geniculate bodies, two small masses of nerve tissue, called external and internal, and separated from each other by a portion of the optic tract. Especial attention should be directed to the fact that the cavities of the brain and spinal cord are directly continuous; thus, we may trace the central canal of the cord into the fourth ventricle, into the Sylvian aqueduct and third ventricle, and thence through the foramen of Monro into the lateral ventricles. This continuity arises from the method by which the nervous system is developed, a central nerve tube running from a very early period throughout the entire length of the body, around which presently appear enlargements of nerve tissue corresponding to the various anatomical divisions of the adult brain. The lateral ventricles of the cerebral hemispheres are pushed forward and outward from each side of the anterior extremity of the central tube.

Organs of Special Sense comprise: the *Nose*, or organ of smell, containing terminal fibers of the first or olfactory nerve; the *Eye*, or organ of sight, supplied by the second or optic nerve; the *Tongue*, or organ of taste, supplied by the gustatory branch of the fifth nerve, and the lingual branch of the glosso-pharyngeal nerve; and the *Ear*, or organ of hearing, supplied by the eighth or auditory nerve. In ad-

dition to these nerves of special sense, localized in their distribution, the skin is supplied with tactile corpuscles, very largely distributed, and presiding over the sense of touch. It is probable that the nerves of smell, hearing, sight, and taste are merely highly specialized modifications of the nerves of touch.

The organ of smell is contained within the nose, and is found in the Schneiderian (mucous) membrane covering the bones and cartilages of the nasal fossæ. The openings of the nose are the nares, anterior on the face, and posterior into the pharynx. Dividing the nose into two more or less equal and parallel fossæ, is a median osseo-cartilaginous septum extending in an antero-posterior plane. Into either fossa project from the lateral aspect the three turbinal bones, twisted like scrolls and covered by the Schneiderian membrane. Upon the walls of the superior meatus only, are found the terminal filaments of the olfactory nerve, thus explaining why it is necessary to inhale deeply into the nose before the sense of smell can be excited by delicate odors. Opening into the nose are the lachrymal canal from the orbit, and the apertures of the frontal, ethmoidal, sphenoidal, and maxillary sinuses.

The Eye is the organ of sight, and with its appendages is located within and in front of the orbit. The appendages include the eyebrows, two projecting lids, and the lachrymal apparatus. Opening on the inner aspect of each lid are lachrymal ducts, conveying the tears from a lachrymal gland, located in the upper and outer segment of the orbit above the upper lid. The tears, after moistening the eye, are carried into a lachrymal sac beneath the inner angle of the lids, by means of two lachrymal canals commencing on the inner extremity of each tarsal cartilage. From the lachrymal sac, the tears fall into the inferior meatus of the nose through the nasal duct. The eyeball lies within the orbital fat and is about one inch in diameter in the transverse plane, somewhat less in the sagittal plane. It is spherical in shape, but the anterior one sixth of the surface is interrupted by a segment of a smaller sphere introduced to form the clear cornea, projecting somewhat beyond the circumference of the posterior larger sphere, the latter being bounded by the tough opaque, and fibrous sclerotic. Entering the eyeball posteriorly is the optic nerve, and rotating it freely upon its cushion of fat are the six ocular muscles, four recti and two oblique. On penetrating the cornea, a clear aqueous humor gushes from that part of the eyeball in front of the crystalline lens. This space is partially divided into a large anterior and a small posterior chamber by the iris; the pupil, or circular opening in the iris, allowing the aqueous humor to circulate in both chambers. The iris is that membrane which gives the eye its color and is composed of circular and radiating muscular (unstriped) fibers, bounding the pupil and inserted circumferentially into the junction of cornea and sclerotic. The choroid is of a deep brownish color, contains many pigment cells, and furnishes the blood-

vessels supplying the eyeball. Hung behind the iris, by means of a suspensory ligament attaching to the ciliary processes, is the crystalline lens enclosed in a transparent capsule. The lens is biconvex, one third of an inch in diameter, one fifth of an inch thick antero-posteriorly, and is composed of concentric and hard but transparent laminae. With its suspensory ligament it separates the aqueous from the vitreous humor. The vitreous humor is a clear, gelatinous fluid filling the larger sphere of the eyeball, and is contained in a thin, transparent, hyaloid membrane by which it is separated from the retina. The retina is the expanded and differentiated termination of the optic nerve, and lies between the choroid and vitreous. It is very scantily pigmented, but at certain thin points, the dark choroid may be seen behind it. Posteriorly, the optic nerve enters it, and anteriorly it terminates at the outer edge of the ciliary processes. At the point of entrance of the optic nerve there are no terminal elements, hence the "blind spot." The retina presents a yellow spot a little external to the entrance of the nerve, at which point vision is held to be most acute. The intimate nervous structure of the retina is made of a series of terminal fibers called rods and cones, arranged in ten layers, in which are also found pigment cells and limiting membranes. The rods and cones lie in a radial direction, and it is a curious fact that their terminal elements are found in contact, not with the vitreous humor, but with the choroid, and are turned away from the point of most immediate contact with the impinging visual ray.

The Ear is divided into external, middle, and internal ear. The external ear is composed of the convoluted portion seen externally, and the external auditory canal, terminating at a depth of one and a quarter inches in the drum membrane. The middle ear, or tympanum, is a cavity in the petrous part of the temporal bone about one sixth of an inch wide, containing the ear bones; it is closed externally by the drum membrane, internally by the wall of the internal ear, and opens by a Eustachian tube passing downward, forward, and inward for one-and-a-half inches into the naso-pharynx. The tympanum is filled with air, and by means of a chain of three small bones, called malleus, incus, and stapes, articulating with one another and connecting the drum membrane with the internal ear, sound waves are transmitted from the outer world to the end filaments of the auditory nerve. Opening posteriorly into the middle ear and serving probably as a sounding board, are the mastoid cells contained within the mastoid portion of the temporal bone. Discharges retained in the middle ear by closure of the Eustachian tube cause abscesses, which, through lack of opportunity to discharge, often spread to the mastoid cells and cause the well-known mastoid abscesses. These latter are occasionally fatal, because the cells are separated by but a thin layer of bone from the brain. The essential part of the organ of

hearing, and the only portion existing in many lower animals, is the internal ear or labyrinth. This is made up of a series of cavities lying within the petrous part of the temporal bone and called the bony labyrinth. Within this bony shell is contained the auditory nerve distributed on the membranous labyrinth, and bathed in the clear endolymph filling the cavity of the labyrinth. The bony labyrinth consists of a vestibule opening into the tympanum by a fenestra ovalis, which is closed by a part of the stapes (ossicle). Piercing the inner wall of the vestibule from the internal auditory meatus are several small openings for the fibers of the auditory nerve; in the anterior wall is an opening into the cochlea; and in the posterior wall are the five openings of the semicircular canals. The semicircular canals are three in number (superior, posterior, and external), lying in transverse, sagittal, and horizontal planes. They contain a part of the membranous labyrinth, within which are found a few small grains of chalky material (otoliths) moving in the endolymph. The cochlea resembles a small shell, and is a canal coiled spirally two-and-a-half times around a columella or central piece; the canal is divided into two compartments, partly by a bony shelf and by a membrane. The semicircular canals contain that portion of the auditory organ devoted to equilibration, the organ of Corti probably presides over sensations more strictly produced by sounds.

The Tongue or organ of taste is supplied with special sense through branches of the glossopharyngeal nerve distributed to the base of that organ. The so-called gustatory or lingual branch of the fifth nerve is distributed to the anterior two thirds of the tongue, and is said to be merely a nerve of common sensation. Located upon the dorsum or upper surface are numerous elevations or papillae, arranged in rows running from the median line obliquely outward and forward. The largest of these, lying most posteriorly, and eight or ten in number, contain the taste buds or terminal modifications of the ninth nerve. Farther forward are more numerous and smaller fungiform papillae, and scattered in among these are the conical (or smallest) papillae. Mucous and serous glands furnish the moisture necessary to bring food substance in contact with the taste buds.

The organs of touch will be described with the skin. See *Histology*.

For minute or textural anatomy, see *Histology*.

For developmental anatomy, see *Embryology*.

Anaxagoras (500-428 B. C.), an ancient Greek philosopher of the Ionic school, born at Clazomenae, in Ionia, gathered around him a circle of renowned pupils, including Pericles, Euripides, Socrates, etc. At the age of fifty he was publicly charged with impiety and sentenced to perpetual banishment. He went to Sampsacus, where he died. He held that there was an infinite number of different kinds

of elementary atoms, and that these, in themselves motionless and originally existing in a state of chaos, were put in motion by an internal, immaterial, spiritual, elementary being, *Nous* (Intelligence), from which motion the world was produced. The stars were, according to him, of earthy materials; the sun a glowing mass, about as large as the Peloponnesus; the earth was flat; the moon a dark, inhabitable body, receiving its light from the sun, the comets wandering stars.

Anaximan' der (611-547 B. C.), an ancient Greek (Ionic) philosopher, was born at Miletus. The fundamental principle of his philosophy is that the source of all things is an undefined substance infinite in quantity. The firmament is composed of heat and cold, the stars of air and fire. The sun occupies the highest place in the heavens, has a circumference twenty-eight times larger than the earth, and resembles a cylinder, from which streams of fire issue. The moon is likewise a cylinder, nineteen times larger than the earth. The earth has the shape of a cylinder, and is placed in the midst of the universe, where it remains suspended. To him is credited the invention of geographical maps and the first application of the style fixed on a horizontal plane to determine the solstices and equinoxes.

Anaximines (an-aks-im'e-nēz) of Miletus, an ancient Greek philosopher, according to whom air was the first principle of all things. Finite things were formed from the infinite air by compression and rarefaction produced by eternally existent motion; and heat and cold resulted from varying degrees of density of the primal element. He flourished about 550 B. C.

Ancachs (ân-kách'), a dep. of Peru, between the Andes and the Pacific. Area 18,000 sq. mi; pop. 284,000.

Archises (an-kî'sēz), the father of the Trojan hero Aeneas, who carried him off on his shoulders at the burning of Troy and made him the companion of his voyage to Italy. He died during the voyage at Drepanum, in Sicily.

Anchor, in Navigation, a crook or hook, an instrument of iron or other heavy material used for holding ships in any situation in which they may be required to lie, and preventing them from drifting by the winds or tides, by the currents of rivers, or any other cause. This is done by the anchor, after it is let down from the ship by means of the cable, fixing itself into the ground, and there holding the vessel fast. The anchor is thus obviously an implement of the first importance in navigation, and one on which too much attention cannot be bestowed in its manufacture and proper construction, seeing that on it depends the safety of the vessel in storms. The invention of so necessary an instrument is to be referred, as may be supposed, to the remotest antiquity. The most ancient anchors consisted merely of large stones, baskets full of stones, sacks filled with sand, or logs of wood loaded with lead.

Anchovy

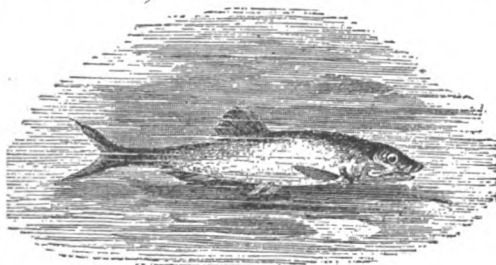
Up to the commencement of the present century what was termed the "old-plan long-shanked" anchor seems to have been generally used. It was made of wrought iron, but the appliances of the anchor smith were so crude that little dependence could be placed upon it.

The size of anchors for various ships has been determined by practise, but is based upon the theory that as the anchor is required to withstand the force brought upon the ship by the wind and tide, which would otherwise cause her to drift, its strength must be nearly proportional to her resistance.

A large ironclad carries 8 anchors—2 bow, 2 sheet, 1 stream, 1 stern, and 2 kedg.

Mooring anchors are those which are placed in harbors, etc., for the convenience of vessels frequenting them. A large *buoy* is attached to the end of the mooring cable, and the ship is made fast to a ring-bolt fitted on the buoy. Mooring anchors are not limited by considerations of weight, etc., as other anchors are, the only requirements being that they have sufficient holding power, and do not project above the ground, as any projection in the shallow waters in which they are usually placed would render ships liable to injury from grounding on them, and be dangerous to fishing-nets, etc.

Anchovy (an-chō'vi), a small fish of the Herring family, all the species, with exception of the common anchovy, inhabitants of the tropical seas of India and America. The common



Anchovy.

anchovy, so esteemed for its rich and peculiar flavor, is not larger than the middle finger. It is caught in vast numbers in the Mediterranean, and frequently on the coasts of France, Holland, and the south of England, and pickled for exportation.

Ancho'vy-pear, a tree of the natural order Myrtaceæ, a native of Jamaica, growing to the height of 50 feet, with large leaves and large white flowers, and bearing a fruit somewhat bigger than a hen's egg, which is pickled and eaten like the mango, which it strongly resembles in taste.

Anco'na, a seaport of Italy, capital of the province of the same name, 130 mi. n. e. of Rome, with harbor works begun by Trajan, who built the ancient mole or quay. A triumphal arch of white marble, erected in honor of Trajan, stands on the mole. Ancona is a station of the Italian fleet, and the

Andersen

commerce is increasing. There is a colossal statue of Count Cavour. Ancona is said to have been founded about four centuries B. C., by Syracusan refugees. It fell into the hands of the Romans in the first half of the third century B. C., and became a Roman colony. Pop. 59,573. The province has an area of 762 sq. mi., and a population of 277,861.

Andalu'sia, a large and fertile district in the south of Spain; area about 33,650 sq. mi., including the modern provinces of Seville, Huelva, Cadiz, Jaen, Cordova, Granada, Almeria, and Malaga. It is traversed by mountains, the loftiest being the Sierra Nevada. Minerals abound, especially in the province of Huelva, where the Tharsis and Rio Tinto copper-mines are situated. The principal river is the Guadalquivir. The vine, myrtle, olive, palm, banana, carob, etc., grow abundantly in the valley of the Guadalquivir. Wheat, maize, barley, and many varieties of fruit grow almost spontaneously; besides which, honey, silk, and cochineal form important articles of culture. The horses and mules are the best in the Peninsula; the bulls are sought for bull-fighting over all Spain; sheep are reared in vast numbers. Agriculture is in a backward state, and the manufactures are by no means extensive. The Andalusians are descended in part from the Moors, of whom they still preserve decided characteristics. Pop. 3,282,448.

An'damans, a chain of islands on the east side of the Bay of Bengal. The inhabitants are about 14,500 in number, and mostly in a very savage state, living almost naked in the rudest habitations. They are small (generally much less than five feet), well formed, and active, skilful archers and canoeists, and excellent swimmers and divers. These islands have been used since 1858 as a penal settlement by the Indian government, the settlement being at Port Blair, on South Andaman.

An'dersen, HANS CHRISTIAN (1805-1875), a famous Danish novelist, poet, and writer of fairy tales, was born at Odense. Picking up what education he could at leisure he wrote several tragedies, and in 1810 went to Copenhagen, but failed in getting any of his plays accepted. His abilities at last brought him under the notice of Councillor Collin, a man of considerable influence, who procured for him free entrance into a government school at Slagelse. From this school he was transferred to the university, and soon became favorably known by his poetic works. He received a royal grant to enable him to travel, and in 1833 he visited Italy, his impressions of which he published in *The Improvisatore*. The scene of his following novel, *O. T.*, was laid in Denmark, and in *Only a Fiddler* he described his own early struggles. In 1835 appeared the first volume of his *Fairy Tales*. Among his other works are, *Picture-books Without Pictures*, *A Poet's Bazaar*, and a number of dramas. In 1845 he received an annuity from the government. He visited England in 1848, and acquired such a command of the language that his next work, *The Two Baronesses*, was

Anderson

written in English. In 1853 he published an autobiography, under the title *My Life's Romance*, an English translation of which, published in 1871, contained additional chapters by the author, bringing the narrative to 1867. Among his later works we may mention, *To Be or Not To Be*; *Tales from Jutland*; *The Ice Maiden*.

Anderson, county seat of Madison co., Ind., 36 m. n. e. of Indianapolis, on the west fork of the White river. It is a railroad center, the principal roads being the Chicago & South-eastern, the Cleveland, Cincinnati, Chicago & St. Louis, and the Pittsburgh, Cincinnati, Chicago & St. Louis. It is also the center of an extensive system of inter-urban electric railways. The city is in a natural gas belt and has important manufactures including iron, steel, wire nails, tiles and glass. It has a free public library, several parks, waterworks and electric light plants. In the vicinity are the historic mounds of the so-called mound builders. Anderson was settled in 1823. Pop. 1900, 20,178.

Anderson, JOHN (1726-1796), professor of natural philosophy in the University of Glasgow, Scotland. By his will he directed that the whole of his effects should be devoted to the establishment of Anderson's University. There were to be four colleges—arts, medicine, law, and theology—besides an initiatory school. As the funds, however, were totally inadequate to the plan, it was at first commenced with only a single course of lectures on natural philosophy and chemistry. The institution gradually enlarged its sphere of instruction, the medical school in particular possessing a high reputation. Latterly it has been incorporated with other institutions to form the Glasgow and West of Scotland Technical College, the medical school, however, retaining a distinct position.

Anderson, MARY, a very beautiful and exemplary American actress; born in California in 1859. Her principal successes were in Shakesperian rôles. She married Antonio F. de Navarro in 1890, and retiring absolutely from the stage, published some interesting memoirs.

Anderson, ROBERT (1805-1871), an American soldier, born in Kentucky. He served in the Black Hawk, Florida, and Mexican wars and was wounded at Molino del Rey. As Major of Artillery he was in charge of Forts Moultrie and Sumter in Charleston Harbor on the outbreak of the Civil War in 1861 and gallantly defended Sumter. He was promoted major-general, and died in France.

Andersonville, Sumter co., Ga., the site of a Confederate prison wherein 12,926 Union soldiers died out of 49,485 confined. Henry Wirz, its superintendent, was convicted by a military commission on a charge of cruelty to prisoners, and hanged Nov. 1, 1865. The site is now a National cemetery, wherein 13,705 soldiers are buried.

Andes (an'déz), or, as they are called in Spanish South America, Cordilleras (ridges) de los Andes, or simply Cordilleras, a range

Andes

of mountains stretching along the whole of the west coast of South America, from Cape Horn to the Isthmus of Panama and the Caribbean Sea. In absolute length (4,500 miles) no single chain of mountains approaches the Andes, and only a certain number of the higher peaks of the Himalayan chain rise higher above the sea level; which peak is highest of all is not yet settled. Several main sections of this huge chain are distinguishable. The Southern Andes present a lofty main chain, with a minor chain running parallel to it on the east, from Terra del Fuego and the Straits of Magellan, rising in Aconcagua to a height of 22,860 feet. North of this is the double chain of the central Andes, inclosing the wide and lofty plateaus of Bolivia and Peru, which lie at an elevation of more than 12,000 feet above the sea. The mountain system is here at its broadest, being about 500 miles across. There are also several very lofty peaks, as Illampu or Sorata (21,484 feet), Sahama (21,054), Illimani (21,024). Farther north the outer and inner ranges draw closer together, and in Ecuador there is but a single system of elevated masses, generally described as forming two parallel chains. In this section are crowded together a number of lofty peaks, most of them volcanoes, either extinct or active. Of the latter class are Pichincha (15,918 feet), with a crater 2,500 feet deep; Tunguragua (16,685 feet); Sangay (17,460 feet); Cotopaxi (19,550 feet). The loftiest summit here appears to be Chimborazo (20,581 feet); others are Antisana (19,260 feet) and Cayambe (19,200 feet). Northward of this section the Andes break into three distinct ranges, the eastmost running northeastward into Venezuela, the westmost running northwestward to the Isthmus of Panama. In the central range is the volcano of Tolima (17,660 feet). The western slope of the Andes is generally exceedingly steep, the eastern much less so, the mountains sinking gradually to the plains. The whole range gives evidence of volcanic action, but it consists almost entirely of sedimentary rocks. Thus mountains may be found rising to the height of over 20,000 feet, and fossiliferous to their summits (as Illimani, and Sorata or Illampu). There are about thirty volcanoes in a state of activity. The loftiest of these burning mountains seems to be Gualatefiri, in Peru (21,960 feet). The heights of the others vary from 13,000 to 20,000 feet. All the districts of the Andes system have suffered severely from earthquakes, towns having been either destroyed or greatly injured by these visitations. Peaks crowned with perpetual snow are seen all along the range, and glaciers are also met with, more especially from Aconcagua southward. The passes are generally at a great height, the most important being from 10,000 to 15,000 feet. Railways have been constructed to cross the chain at a similar elevation. The Andes are extremely rich in the precious metals, gold, silver, copper, platinum, mercury, and tin, all being wrought; lead and iron are also found. In the Andes are towns at a greater elevation than anywhere else in the world, the highest being

Andorre

the silver mining town of Cerro de Pasco (14,270 feet), the next being Potosi.

Andorre' (or Andor'ra), a small, nominally independent state in the Pyrenees, with an area of about 230 sq. mi.; pop. 10,000. It has been a separate state for six hundred years; is governed by its own civil and criminal codes, and has its own courts of justice, the laws being administered by two judges, one of whom is chosen by France, the other by the Bishop of Urgel, in Spain. The chief industry is the rearing of sheep and cattle. The commerce is largely in importing contraband goods into Spain. Capital, Old Andorré.

Andover, Essex co., Mass., on Shaushin River, 3 mi. e. of Lawrence. Railroad, western division of Boston & Maine. Industries: woolen mills, flax mill, flannel mill, and rubber company. Surrounding country agricultural. Seat of Andover Theological Seminary, Phillips Academy, and Abbot Academy. The town was first settled in 1646. Pop. 1900, 6,813.

Andrassy (än-drä'shë), COUNT JULIUS (1823-1890), Hungarian statesman; took part in the revolution of 1848, was condemned to death, but escaped and went into exile; appointed premier when self-government was restored to Hungary in 1867; became imperial minister for foreign affairs in 1871, retiring from public life in 1879.

André (än'dră), MAJOR JOHN, adjutant-general in the British army during the American Revolutionary war. Employed to negotiate the treason of the American general, Arnold, and the delivery of the works at West Point, he was apprehended in disguise, Sept. 23, 1780, within the American lines; declared a spy from the enemy, and hanged Oct. 2, 1780. His remains were taken to England in 1821 and interred in Westminster Abbey, where a monument has been erected to his memory. Much sympathy was felt for him in the patriot army, but military jurists are agreed that his punishment was merited and necessary. His own letter to Washington was so frank an admission of guilt as to warrant his conviction, and his one chance of escape was destroyed by the British refusal to surrender Arnold. André's personal characteristics made him a universal favorite, and the entire British army wore crape at his loss. His error lay in landing to confer with Arnold, in assuming disguise, and taking a false name in the safe-conduct or pass given him by Arnold.

Andree, S. A., distinguished Swedish civil engineer and scientific aeronaut, who proposed in 1895 to make a journey to the North Pole by balloon. He constructed a balloon that would hold gas for three months, with provision to refill if necessary, and buoyant enough to carry three persons, with provisions and apparatus. In the summer of 1896 he conveyed his apparatus to a small island north of Spitzbergen, but the winds proved adverse and the effort was not made. He succeeded in getting away in 1897 and has not been heard from since.

An'drews, ELISHA BENJAMIN, D.D., LL.D., born at Hinsdale, N. H., graduated at Brown

Andrews

University, 1870. He taught two years at Suffield, Conn., and was a student at the Theological Institute, 1872-74. He preached one year at Beverly, Mass., and was president of Denison University, Ohio, 1875-79. He studied in Europe, 1882-3, and was professor of public finance at Cornell University, 1888-9. He was president of Brown University 1889-1898; superintendent of the Chicago public schools 1898-1900. In 1900 he became president of the University of Nebraska. He was a Union soldier, 1861-65. Among the books of which he is author, are, *Institutes of Economics*, *Institutes of General History*, *Hist. of U. S.*

An'drew, JOHN ALBION (1818-1867), born in Albion, Me. He was graduated at Bowdoin, studied law, and was admitted to practise at Boston. He became an antislavery man, and was elected to the Legislature in 1858. In 1860 he was a delegate to the Republican convention which nominated Abraham Lincoln for president, and in the same year was elected governor of Massachusetts. To this office he was re-elected until 1866. In January, 1861, he began to prepare for war by reorganizing the militia. He also called on the governors of the other New England states to do likewise. Within a week after the president's proclamation of 1861, he dispatched five regiments of infantry, a battalion of riflemen, and a battery of artillery to Washington. In September, 1862, he attended the convention of the governors of the loyal states at Altoona, Pa., and drew up the address they presented to the president.

An'drews, LANCELOT (1555-1626), bishop of the English Church; high in favor both with Queen Elizabeth and James I. In 1605 he became bishop of Chichester, in 1609 was transferred to Ely, and appointed one of the king's privy-councillors; and in 1618 he was transferred to Winchester. He was one of those engaged in preparing the Authorized Version of the Scriptures. He left sermons, lectures, and other writings.

An'drews, ST., an ancient city in Fifeshire, Scotland, 31 mi. n.e. from Edinburgh; was erected into a royal burgh by David I in 1140, and after having been an episcopal, became an archiepiscopal see in 1472, and was for long the ecclesiastical capital of Scotland. The cathedral, now in ruins, was begun about 1160, and took 157 years to finish. The old castle, founded about 1200, and rebuilt in the fourteenth century, is also an almost shapeless ruin. In it James III was born and Cardinal Beaton assassinated, and in front of it George Wishart was burned. There are several other interesting ruins. The trade and manufactures are of no importance, but the town is in favor as a watering-place. Golf is much played here. Pop. 7,000. **THE UNIVERSITY OF ST. ANDREWS**, the oldest of the Scotch universities, founded in 1411, consists of three colleges, St. Salvator, St. Leonard's, and St. Mary's. Originally all three had teachers both in arts and theology; but in 1579 the colleges of St. Salvator and St. Leonard were confined to the teaching of arts



EMINENT WOMEN

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and medicine, and that of St. Mary to theology. In 1747 the two former colleges were united by act of Parliament. Degrees are conferred in arts, divinity, medicine, and law; but there is a complete teaching staff only in arts and divinity.

Andrews, STEPHEN PEARL (1812-1886), author, b. in Templeton, Mass. He studied at Amherst College, removed to New Orleans, La., became a lawyer, and in 1839 went to Texas. In 1843 Andrews went to England to raise money with which to purchase the freedom of the Texan slaves, and render it a free state. He was unsuccessful, and returned home, settling in Boston, where he became a leader in the antislavery movement. In 1847 he removed to New York City, where he published a series of phonographic instruction books. He was an accomplished linguist. He also evolved a scientific universal language called "Alwato;" in this he conversed and corresponded with his pupils, and was preparing a dictionary of it at the time of his death.

An'dria, a town of south Italy, province of Bari, with a fine cathedral, founded in 1046; the church of Sant' Agostino, with a beautiful pointed Gothic portal; a college; manufactures of majolica, and a good trade. Pop. 37,192.

Andromache (an-drom'a-kē), in Greek mythology, wife of Hector, one of the most attractive female characters of Homer's *Iliad*. The passage describing her parting with Hector when he was setting out to his last battle, is well known and much admired. Euripides and Racine have made her the chief character of tragedies.

Androm'eda, in Greek mythology, daughter of the Ethiopian king Cepheus and of Cassiopeia. Cassiopeia having boasted that her daughter surpassed the Nereids, if not Hēra (Juno) herself, in beauty, the offended goddesses prevailed on their father, Poseidōn (Neptune), to afflict the country with a horrid sea-monster, which threatened universal destruction. To appease the offended god, Andromeda was chained to a rock, but was rescued by Perseus; and after death, was changed into a constellation.

Androni'cus, the name of four emperors of Constantinople. **ANDRONICUS I**, Comnenus, b. 1110, murdered 1185. **ANDRONICUS II**, Palæologus, b. 1258, d. 1332. His reign is celebrated for the invasion of the Turks. **ANDRONICUS III**, Palæologus the Younger, b. 1296, d. 1341. **ANDRONICUS IV**, Palæologus, reigned in the absence of John IV. In 1373 he gave way to his brother Manuel, and d. a monk.

Androni'cus of Rhodes, a Peripatetic philosopher who lived at Rome in the time of Cicero. He arranged Aristotle's works in much the same form as they retain in present editions.

Androni'cus, **LIVIVS**, the most ancient of the Latin dramatic poets; flourished about 240 B. C.; by origin a Greek, and long a slave. A few fragments of his works have come down to us.

Androni'cus Cyrrhestes (sir-es'tēz), a Greek architect about 100 B. C., who constructed at Athens the Tower of the Winds, an octagonal building, still standing. On the top was a Triton, which indicated the direction of the wind. Each of the sides had a sort of dial, and the building formerly contained a clepsydra or water-clock.

Andros, **SIR EDMUND** (1637-1714), an English colonial governor. Governor of New York in 1674; of New England 1686, of Virginia 1692. He died in England. His conduct in New England was tyrannical and his taxation of the colonists extremely unpopular. His expedition to Hartford gave rise to the Charter Oak incident.

Andros Islands, a group of isles belonging to the Bahamas, lying southwest of New Providence, not far from the east entrance to the Gulf of Florida. The passages through them are dangerous.

Andujar (än-dō-hār'), a town in Spain, in Andalusia, 50 mi. e. n. e. of Cordova, manufactures a peculiar kind of porous earthen water bottles and jugs. Pop. 12,605.

Anega'da, a British West Indian island, the most northern of the Virgin group, 10 mi. long by 4½ broad; contains numerous salt ponds, from which quantities of salt are obtained.

Anemom'eter, an instrument for measuring the force and velocity of the wind. This force is usually measured by the pressure of the wind upon a square plate attached to one end of a spiral spring (with its axis horizontal), which yields more or less according to the force of the wind, and transmits its motion to a pencil which leaves a trace upon paper moved by clockwork. For indicating the velocity of the wind, the instrument which has yielded the best results consists of four hemispherical cups, attached to the ends of equal horizontal arms, forming a horizontal cross which turns freely about a vertical axis. By means of an endless screw, carried by the axis, a train of wheel-work is set in motion; and the indication is given by a hand which moves round a dial; or in some instruments by several hands moving round different dials like those of a gas-meter. It is found that the center of each cup moves with a velocity which is almost exactly one third of that of the wind. There are various other forms of instruments, one of which is portable, and is especially intended for measuring the velocity of currents of air passing through mines, and the ventilating spaces of hospitals and other public buildings. The direction of the wind as indicated by a vane can also be made to leave a continuous record by various contrivances; one of the most common being a pinion carried by the shaft of a vane, and driving a rack which carries a pencil.

Anem'oscope, any contrivance indicating the direction of the wind; generally applied to a vane which turns a spindle descending through the roof to a chamber, where, by means of a compass-card and index, the direction of the wind is shown.

Angel

Angel, one of those spiritual intelligences who are regarded as dwelling in heaven and employed as the ministers or agents of God. Scripture frequently speaks of angels, but with great reserve, Michael and Gabriel alone being mentioned by name in the canonical books, while Raphael is mentioned in the Apocrypha.

Angel, a gold coin introduced into England in the reign of Edward IV and coined down to the Commonwealth, so named from having



Angel of Edward IV.

the representation of the archangel Michael piercing a dragon upon it. It had different values in different reigns, varying from \$1.75 to \$2.50.

Angel-fish, a fish nearly allied to the sharks, very ugly and voracious, preying on other fish. It is from 6 to 8 feet long, and takes its name from its pectoral fins, which are very large, extending horizontally like wings when spread. This fish connects the rays with the sharks, but it differs from both in having its mouth placed at the extremity of the head.

Angelico (ân-jel'i-kô), FRA (1387-1455), the common appellation of *Fra Giovanni da Fiesole*, one of the most celebrated of the early Italian painters. He entered the Dominican order in 1407, and was employed by Cosmo de Medici in painting the monastery of St. Mark and the church of St. Annunziata with frescoes. These pictures gained him so much celebrity that Nicholas V invited him to Rome, to ornament his private chapel in the Vatican, and offered him the archbishopric of Florence, which was declined. His works were considered unrivaled in finish and in sweetness and harmony of color, and were made the models for religious painters of his own and succeeding generations.

Angell, JAMES BURRILL, LL. D., was born in Rhode Island, 1829, graduated at Brown University, 1849, and later became professor of modern languages and literature in the same university. In 1860 he became editor of the *Providence Journal*, in 1866 president of the University of Vermont, and in 1871 president of the University of Michigan, where he is at present. He was minister to China in 1880-81, and is a regent of the Smithsonian Institute. He was appointed minister to Turkey by President McKinley in 1897.

Angelo (ân'je-lo), MICHAEL (Buonarroti) (1475-1563), b. at Caprese, in Tuscany, d. in Rome. He was of the ancient family of the counts of Canossa. He became a distinguished Italian painter, sculptor, architect, and poet. He studied drawing under Domenico Ghirlandaio, and sculpture under Bertoldo

Angina Pectoris

at Florence, and having attracted the notice of Lorenzo de Medici, was for several years an inmate of his household. Having distinguished himself both in sculpture and painting, he was commissioned (together with Leonardo da Vinci) to decorate the senate-hall at Florence with a historical design, but before it was finished, in 1505, he was induced by Pope Julius II to settle in Rome. Here he sculptured the monument of the pontiff (there are seven statues belonging to it) now in the church of St. Pietro in Vincoli; and painted the dome of the Sistine Chapel, his frescoes representing the creation and the principal events of sacred history. In 1530 he took a leading part in the defense of Florence against Charles V. Three years later he began his great picture in the Sistine Chapel, *The Last Judgment*, which occupied him eight years. His last considerable works in painting were two large pictures: the *Conversion of St. Paul*, and *The Crucifixion of St. Peter*, in the Pauline Chapel. In sculpture he executed *The Descent of Christ from the Cross*, four figures, of one piece of marble. His statue of *Bacchus* was thought by Raphael to possess equal perfection with the masterpieces of Phidias and Praxiteles. As late as 1546 he was obliged to undertake the continuation of the building of St. Peter's, and planned and built the dome, but he did not live long enough to see his plan finished, in which many alterations were made after his death. Besides this, he undertook the building of the Piazza del Campidoglio (Capitol) of the Farnese Palace, and of many other edifices. His style in architecture is distinguished by grandeur and boldness, and in his ornaments the untamed character of his imagination frequently appears, preferring the uncommon to the simple and elegant. His poems, which he considered merely as pastimes, contain, likewise, convincing proofs of his great genius. His prose works consist of lectures, speeches, etc.

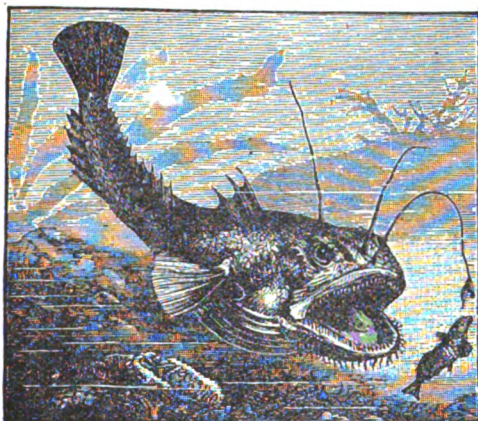
Angers (ân-zhâ), a town and river port of France, capital of the department of Maine-et-Loire, and formerly of the province of Anjou, 5½ mi. from the Loire, 150 mi. s. w. of Paris. Has an old castle, once a place of great strength, now used as a prison, barrack, and powder-magazine; a fine cathedral of the twelfth and thirteenth centuries, with very fine old painted windows, is the seat of a bishop, and has a school of arts and manufactures; a public library, an art-gallery, a large modern hospital, the remains of a hospital founded by Henry II of England in 1155, courts of law, theater, etc. Manufactures: sail-cloth, hosiery, leather, and chemicals, foundries, etc. In the neighborhood are immense slate-quarries. Pop. 73,044.

Angina Pectoris (an-jî'na pek'to-ris), or Heart-spasm, a disease characterized by an extremely acute constriction, felt generally in the lower part of the sternum, and extending along the whole side of the chest and into the corresponding arm, a sense of suffocation, faintness, and apprehension of approaching death; seldom experienced by any but those with organic heart-disease. The disease rarely

Angler

occurs before middle age and is more frequent in men than in women. Those liable to attack must lead a quiet, temperate life, avoiding all scenes which would unduly rouse their emotions. The first attack is occasionally fatal, but usually death occurs as the result of repeated seizures. The paroxysm may be relieved by opiates, or the inhalation, under due precaution, of anæsthetic vapors.

Angler, also from its habits and appearance called *Fishing-frog* and *Sea-devil*, a remarkable fish often found on the British coasts. It is from 3 to 5 feet long; the head is very wide, depressed with protuberances, and bearing long separate movable tendrils; the mouth is



Angler.

capacious. The American Angler, Fishing-frog or Goose-fish, of the Atlantic, is from two to three feet long; it is exceedingly voracious; its large mouth allows it to swallow fish about as big as itself.

Angles, a low German tribe who in the earliest historical period had their seats in the district about Angeln, in the duchy of Sleswig, and who in the fifth century subsequently crossed over to Britain along with bands of Saxons and Jutes (and probably Frisians also), and colonized a great part of what from them has received the name of England, as well as a portion of the Lowlands of Scotland. The Angles formed the largest body among the Germanic settlers in Britain, and founded the three kingdoms of East Anglia, Mercia, and Northumbria.

Anglesey (ang'gl-sē) (or Anglesea) ("the Angles' Island"), an island and county of north Wales, separated from the mainland by the Menai Strait. Area 193,511 acres; pop. 50,500. The chief agricultural products are oats and barley, wheat, rye, potatoes, and turnips. Numbers of cattle and sheep are raised. Anglesey yields a little copper, lead, silver, ocher, etc. The Menai Strait is crossed by a magnificent suspension-bridge, 580 feet between the piers and 100 feet above high-water mark, and also by the great Britannia Tubular Railway Bridge. The chief market

Angling

towns are Beaumaris, Holyhead, Llangefni, and Amlwch.

Anglican Church, a term which strictly embraces only the Church of England and the Protestant Episcopal churches in Ireland, Scotland, and the colonies; but is sometimes used to include also the Episcopal churches of the U. S. The doctrines of the Anglican Church are laid down in the Thirty-nine Articles, and its ritual is contained in the *Book of Common Prayer*. Within the body there is room for considerable latitude of belief and doctrine, and three sections are sometimes spoken of by the names of the High Church, Low Church, and Broad Church.

Angling, the art of catching fish with a hook, or *angle* baited with worms, small fish, flies, etc. We find occasional allusions to this pursuit among the Greek and Latin classical writers. It is mentioned several times in the Old Testament, and it was practised by the ancient Egyptians. The oldest work on the subject in English is the *Treatyse of Fysshinge with an Angle*, printed by Wynkyn de Worde, in 1496, along with treatises on hunting and hawking, the whole being ascribed to Dame Juliana Berners, or Barnes, prioress of a nunnery near St. Albans, England. Walton's inimitable discourse on angling was first printed in 1653. The chief appliances required by an angler are a rod, line, hooks, and baits. Rods are made of various materials, and of various sizes. The cane rods are lightest; and where fishing-tackle is sold they most commonly have the preference; but in country places the rod is often of the angler's own manufacture. Rods are commonly made in separate joints so as to be easily taken to pieces and put up again. They are made to taper from the butt end to the top, and are usually possessed of a considerable amount of elasticity. In length they may vary from ten feet to more than double, with a corresponding difference in strength—a rod for salmon being necessarily much stronger than one suited for ordinary brook trout. The *reel*, an apparatus for winding up the line, is attached to the rod near the lower end, where the hand grasps it while fishing. The best are usually made of brass, are of simple construction, and are so made as to wind or unwind freely and rapidly. That part of the line which passes along the rod and is wound on the reel is called the *reel line*, and may vary from 26 to 100 yards in length, according to the size of the water and the habits of the fish angled for; it is usually made of twisted horsehair and silk, or of oiled silk alone. The casting line, which is attached to this, is made of the same materials but lighter and finer. To the end of this is tied a piece of fine gut, on which the hook or hooks are fixed. The casting or gut lines should decrease in thickness from the reel line to the hooks. The hook of finely tempered steel should readily bend without breaking, and yet retain a sharp point. It should be long in

Anglo-Saxons

the shank and deep in the bend; the point straight and true to the level of the shank; and the barb long. Their sizes and sorts must of course entirely depend on the kind of fish that are angled for. Floats formed of cork, goose and swan quills, etc., are often used to buoy up the hook so that it may float clear of the bottom. For heavy fish or strong streams a cork float is used; in slow water and for lighter fish, quill floats. *Baits* may consist of a great variety of materials, natural or artificial. The principal natural baits are worms: common garden worms, brandlings, and red worms, maggots, or gentles (the larvæ of blow-flies such as are found on putrid meat), insects, small fish (as minnows), salmon roe, etc. The artificial flies so much used in angling for trout and salmon are composed of hairs, furs, and wools of every variety, mingled with pieces of feathers and secured together by plaited wire, or gold and silver thread, marking silk, wax, etc. The wings may be made of the feathers of domestic fowls, or any others of a showy color. Some angling authorities recommend that the artificial flies should be made to resemble as closely as possible the insects on which the fish is wont to feed, but experience has shown that the most capricious and unnatural combinations of feather, fur, etc., have been often successful where the most artistic imitations have failed. Artificial minnows, or other small fish, are also used by way of bait, and are so contrived as to spin rapidly when drawn through the water in order to attract the notice of the fish angled for. Angling, especially with the fly, demands a great deal of skill and practise, the throwing of the line properly being the initial difficulty. Nowhere is the art pursued with greater success and enthusiasm than in the U. S.

Anglo-Saxons, the name commonly given to the nation or people formed by the amalgamation of the Angles, Saxons, and Jutes, who settled in Britain in the fifth and sixth centuries after Christ, the Anglo-Saxons being simply the English people of the earlier period of English history. The tribes who were thus the ancestors of the bulk of the English-speaking nationalities came from north Germany where they inhabited the parts about the mouths of the Elbe and Weser, and the first body of them who gained a footing in Britain are said to have landed in 449, and to have been led by Hengist and Horsa. From the preponderance of the Angles the whole country came to be called *Engla-land*; that is, the land of the Angles or English. Modern officials such as sheriffs and aldermen and at least one rank of nobility, that of earl, owe their origin to Anglo-Saxon institutions.

Ango'la, a Portuguese territory in Western Africa, s. of the Congo; area 300,000 sq. mi.; pop. 2,000,000; sometimes in the northern part of it, also known as Loanda. The principal town is the seaport of St. Paul de Loanda, which was long the great Portuguese slave-mart.

Anhalt

Exports: ivory, palm oil, coffee, hides, gum, wax, etc. Pop. 600,000.

Ango'ra, a town in the interior of Asiatic Turkey, 215 mi. e.s.e. of Constantinople, with considerable remains of Byzantine architecture, and relics of earlier times, both Greek and Roman, such as the remnants of the Monumentum Ancyranum, raised in honor of the Emperor Augustus. All the animals of this region are long haired, especially the goats (see *Goat*), sheep, and cats. This hair forms an important export, as well as the fabric called camlet here manufactured from it, other exports being goats' skins, dye-stuffs, gums, honey, and wax, etc. Est. pop. 35,000.

Angostu'ra (or Ciudad Bolivar), a city of Venezuela, capital of the province of Bolivar, on the Orinoco, about 240 mi. from the sea. Exports: gold, cotton, indigo, tobacco, coffee, cattle, etc.; imports: manufactured goods, wines, flour, etc. Pop. 10,861.

Angostura Bark, the aromatic bitter medicinal bark obtained chiefly from a tree of 10 to 20 feet high, growing in the northern regions of South America. The bark is valuable as a tonic and febrifuge, and is also used for a kind of bitters. From this bark being adulterated, indeed sometimes entirely replaced, its use as a medicine has been almost given up.

Angoulême (ân-gô-lâm), an ancient town of western France, capital of dep. Charente, 60 mi. n.n.e. of Bordeaux. It has a fine old cathedral, a beautiful modern town-hall, a lyceum, public library, natural history museum, hospital, lunatic asylum, etc. There are manufactures of paper, woollens, linens, distilleries, sugar-works, tanneries, etc. Pop. 38,068.

Angra (ân'grâ), a seaport of Terceira, one of the Azores, with the only convenient harbor in the whole group. It has a cathedral, a military college, and arsenal, etc., and is the residence of the governor-general of the Azores and of the foreign consuls. Pop. 11,281.

Angra Pequena ("little bay"), a bay on the west of Namaqualand, S. Africa, where the German commercial firm Lüderitz in 1883 acquired a strip of territory and established a trading station. In 1884, notwithstanding some weak protests of the British, Germany took under her protection the coast territory around this port, and soon after extended the protectorate to the Portuguese frontier, but not including the British settlement of Wal-fisch Bay.

Anguilla (ang-gil'a) (or Snake Island), one of the British West India Islands, 60 mi. n. e. of St. Kitts. Area 35 sq. mi. A little sugar, cotton, tobacco, and maize are grown. There is a saline lake in the center which yields a large quantity of salt. Pop. 2,773, of which 100 is white.

An'halt, a duchy of north Germany, area 906 sq. mi. All sorts of grain, wheat especially, are grown in abundance; also flax, rape, potatoes, tobacco, hops, and fruit. Excellent cattle are bred. The inhabitants are principally occupied in agriculture, though there are some iron works and manufactures

Anhydrite

of woolens, linens, beet-sugar, tobacco, etc. The united principality is now incorporated in the German Empire, and has one vote in the Bundesrath and two in the Reichstag. Pop. 293,298 almost all Protestants. The chief towns are Dessau, Bernburg, Köthen, and Zerbst.

Anhy'drite, anhydrous sulphate of calcium, a mineral presenting several varieties of structure and color. The *vulpinite* of Italy possesses a granular structure, resembling a coarse-grained marble, and is used in sculpture. Its color is grayish white, intermingled with blue.

An'iline, a substance which has become of great importance, as being the basis of a number of brilliant and durable dyes. It is found in small quantities in coal-tar, but the aniline of commerce is obtained from benzine or benzole, a constituent of coal-tar, consisting of hydrogen and carbon. Benzine, when acted on by nitric acid, produces nitro-benzine; and this substance again, when treated with nascent hydrogen, generally produced by the action of acetic acid upon iron-filings or scraps, produces aniline. It is a colorless, oily liquid, somewhat heavier than water, with a peculiar, vinous smell, and a burning taste. Its name is derived from *anil*, the Portuguese and Spanish name for indigo, from the dry distillation of which substance it was first obtained by the chemist Unverdorben in 1826. When acted on by arsenious acid, bichromate of potassium, stannic chloride, etc., aniline produces a great variety of compounds, many of which are possessed of very beautiful colors, and are known by the names of aniline purple, aniline green, roséine, violine, bleu de Paris, magenta, etc. The manufacture of these aniline or coal-tar dyes as a branch of industry was introduced in 1856 by Perkin of London. Since then the manufacture has reached large dimensions.

Animal, an organized and sentient living being. Life in the earlier periods of natural history was attributed almost exclusively to animals. With the progress of science, however, it was extended to plants. In the case of the higher animals and plants there is no difficulty in assigning the individual to one of the two great kingdoms of organic nature, but in their lowest manifestations, the vegetable and animal kingdoms are brought into such immediate contact that it becomes almost impossible to assign them precise limits, and to say with certainty where the one begins and the other ends. From *form* no absolute distinction can be fixed between animals and plants. Many animals, such as the sea-shrubs, sea-mats, etc., so resemble plants in external appearance that they were, and even yet popularly are, looked upon as such. With regard to *internal structure* no line of demarkation can be laid down, all plants and animals being, in this respect, fundamentally similar; that is, alike composed of molecular, cellular, and fibrous tissues. Neither are the chemical characters of animal and vegetable substances more distinct. Animals contain in their tissues and fluids a larger proportion of nitrogen

Animal

than plants, while plants are richer in carbonaceous compounds than the former. In some animals, moreover, substances, almost exclusively confined to plants, are found. Thus the outer wall of Sea-squirts contains *cellulose*, a substance largely found in plant-tissues; while *chlorophyll*, the coloring-matter, of plants, occurs in Hydra and many other lower animals. *Power of motion*, again, though broadly distinctive of animals, cannot be said to be absolutely characteristic of them. Thus many animals, as oysters, sponges, corals, etc., in their mature condition are rooted or fixed, while the embryos of many plants, together with numerous fully developed forms, are endowed with locomotive power by means of vibratile, hair-like processes called cilia. The distinctive points between animals and plants which are most to be relied on are those derived from the *nature and mode of assimilation of the food*. Plants feed on *inorganic matters*, consisting of water, ammonia, carbonic acid, and mineral matters. They can only take in food which is presented to them in a *liquid or gaseous* state. The exceptions to these rules are found chiefly in the case of plants which live *parasitically* on other plants or on animals, in which cases the plant may be said to feed on organic matters, represented by the juices of their hosts. Animals, on the contrary, require *organized matters* for food. They feed either upon plants or upon other animals. But even carnivorous animals can be shown to be dependent upon plants for subsistence, since the animals upon which Carnivora prey are in their turn supported by plants. Animals, further, can subsist on *solid* food in addition to liquids and gases; but many animals (such as the Tapeworms) live by the mere imbibition of fluids which are absorbed by their tissues, such forms possessing no distinct digestive system. Animals require a due supply of *oxygen gas* for their sustenance, this gas being used in respiration. Plants, on the contrary, require *carbonic acid*. The animal exhales or gives out carbonic acid as the part result of its tissue-waste, while the plant taking in this gas is enabled to decompose it into its constituent carbon and oxygen. The plant retains the former for the uses of its economy, and liberates the oxygen, which is thus restored to the atmosphere for the use of the animal. Animals receive the food into the interior of their bodies, and assimilation takes place in their internal surfaces. Plants, on the other hand, receive their food into their external surfaces, and assimilation is effected in the external parts, as is exemplified in the leaf-surfaces, under the influence of sunlight. All animals possess a certain amount of heat or temperature which is necessary for the performance of vital action. The only classes of animals in which a constantly-elevated temperature is kept up are birds and mammals. The bodily heat of the former varies from 100° F. to 112° F., and of the latter from 96° F. to 104° F. The mean or average heat of the human body is about 99° F., and it never falls much below this in health. Below birds,

Animal Chemistry

animals are named "cold-blooded;" this term meaning in its strictly physiological sense that their temperature is usually that of the medium in which they live, and that it varies with that of the surrounding medium. "Warm-blooded" animals, on the contrary, do not exhibit such variations, but mostly retain their normal temperature in any atmosphere. The cause of the evolution of heat in the animal body is referred to the union (by a process resembling ordinary combustion) of the carbon and hydrogen of the system with the oxygen taken in from the air in the process of respiration.

Animal Chemistry, the department of organic chemistry which investigates the composition of the fluids and the solids of animals, and the chemical action that takes place in animal bodies. There are four elements, sometimes distinctively named *organic elements*, which are invariably found in living bodies; viz., carbon, hydrogen, oxygen, and nitrogen. To these may be added, as frequent constituents of the human body, sulphur, phosphorus, lime, sodium, potassium, chlorine, and iron. The four organic elements are found in all the fluids and solids of the body. Sulphur occurs in blood and in many of the secretions. Phosphorus is also common, being found in nerves, in the teeth, and in fluids. Chlorine occurs almost universally throughout the body; lime is found in bone, in the teeth, and in the secretions; iron occurs in the blood, in urine, and in bile; and sodium, like chlorine, is of almost universal occurrence. Potassium occurs in muscles, in nerves, and in the blood corpuscles. Minute quantities of copper, silicon, manganese, lead, and lithium are also found in the human body. The compounds formed in the human organism are divisible into the organic and inorganic. The most frequent of the latter is water, of which two thirds (by weight) of the body is composed. The organic compounds may, like the *foods* from which they are formed, be divided into the nitrogenous and non-nitrogenous. Of the former the chief are albumen (found in blood, lymph, and chyle), casein (found in milk), myosine (in muscle), gelatine (obtained from bone), and others. The non-nitrogenous compounds are represented by organic acids, such as formic, acetic, butyric, stearic, etc.; by animal starches, sugars; and by fats and oils, as stearine and olein.

Animalcule (an-i-mal'kūl), a general name given to many forms of animal life from their minute size. We thus speak of the Infusoria Animalcules among the Protozoa, of the Rotifera or Wheel Animalcules, etc., but the term is not now used in zoology in any strict significance, nor is it employed in classification.

Animal Intelligence.—In considering the intelligence of animals we must guard against errors resulting from reading human experiences into brute life. It is rather difficult to provide against this common mistake; but it makes results unreliable if we interpret the various expressions of animals in the light of human experiences alone.

Animal Intelligence

We gain the best conception of the mentality of animals by studying them from the point of view of the elements of mental life. What elements of consciousness are possessed by this or that animal, and what characteristics are absent that are so essential to human mind? Do all animals possess the same senses—seeing, hearing, smell, taste, temperature, touch, etc.—as do human beings? What can be said of their memory power? Do they form mental images? Have they the powers of judgment and comparison? Do they experience emotions such as anger, grief, joy? Are they able to reason? Let us consider some of these elements of mental life more particularly as being present or absent in the experiences of the lower animals.

SENSE POWERS.—The sense experiences constitute the most important of all the group of facts that go to make up mental life. The senses furnish the raw material for the mind to operate on in its acts of memory, imagination, judgment, comparison, reasoning, and the higher processes. What we remember depends upon what we have received through our senses. What we compare are the data gained from sense experiences of various sorts. We reason about material furnished the mind through the various avenues of sense.

TOUCH.—The various parts of the human body differ in the delicacy of the sense of touch. The red part of the lips, the finger tips, the tip of the tongue have a more delicate sense of touch than any other portion of the human body. The covering or skin of the various animals differs greatly in the delicacy of the tactile sense. In some animals special hairs are very delicate touch-organs, as in the whiskers of the cat and the long hair on the rabbit's lip. With the aid of these the rabbit can readily find the way to the burrow in the densest darkness; clip them off, and the poor animal is unable to find its way in the dark. The wing of the bat is very sensitive to touch. Through that sense alone the bat is able to direct its way while flying rapidly through the darkest caves. Many insects as well as the crustaceans are covered with a tough skin and sometimes with even a dense armor, and many would suppose that such creatures would be deprived of the sense of touch. But even in these animals the sense of touch is by no means absent. Seated on the tough skin are little hairs almost invisible, through the base of which a little delicate nerve passes through a very small perforation in the integument. These are very numerous in the end branches of the legs of many insects. It seems that even the lowest forms of animal life (the primitive amœba, for example) possess the sense of touch in a greater or less degree. And by the way, this is the most important sense of all those with which even human beings are endowed.

TEMPERATURE SENSE.—This is closely associated with the sense of touch. It has been shown by Goldscheider and others that there are on the skin of the human hand, for example, special points that are sensitive to heat and cold. These are called heat and cold

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spots. Neither the heat nor cold spots are sensitive to pressure, pain, touch, or any other stimulus. They are nervous end-organs set apart for the special service of the temperature sense. They are present in some of the lower animals.

TASTE.—This sense is brought into exercise by fluids coming into contact with special end-organs, like the taste bulbs located in the skin covering the tongue and palate of the human being. What is ordinarily called taste is really taste plus smell. If the nose be stopped so that air cannot pass over the olfactory end-organs, one cannot tell the taste of the scraped apple, pear, banana, peach, or onion from one another. These substances cannot be distinguished from each other by taste alone. Vanilla is almost absolutely tasteless, but is detected in the ice cream by its odor rather than taste. On the other hand quinine is absolutely odorless, but has a marked bitter taste. Tastes are classified into sweet, sour, salt, bitter, and alkaline.

In birds and reptiles the sense of taste is not very well developed. Parrots have the most delicate sense of taste of all the birds. A snake, when partially blind owing to a change of skin, will eat a piece of cloth as readily as a field mouse. In fishes the scales and skin are provided with sense organs that distinguish the taste of liquids. In the codfish these taste bulbs are located along the clearly marked lines on both its sides. Caterpillars refuse to eat certain herbs because of their bitter taste. Moisten the end of the legs (where the taste organs are located) of the cockroach with a bitter solution (quinine) and see how quickly he tries to get rid of it. Butterflies are delighted with sweetened water. Drop a little Epsom Salts into such a solution, and the poor butterfly spits and sputters and hastily leaves off his indulgence. Tempt bees with sugar, and they will rapidly congregate in great glee. Substitute powdered alum for the sugar, and they will become viciously angry. Mix strychnine and honey and offer it to a colony of ants. The smell of the honey will attract them, but when they begin to feed, the effect of the taste at once becomes evident.

SMELL.—In some of the lower animals this sense is exceedingly acute. See how the dog can track its master through the crowded street. Deer are also endowed with an exceedingly keen sense of smell. In birds this sense is but little developed. Even vultures cannot detect the presence of food when it is hidden from their sight. Reptiles likewise are very dull with respect to the sense of smell. Among the fishes the shark has a very keen sense of smell. Deprive it of this sense, and it will refuse to eat or move, but becomes perfectly helpless. The shark is so dependent on the sense of smell that it will starve when unable to exercise this sense, though food be placed immediately in front of it where it can be plainly seen. There is no doubt that insects possess the sense of smell in a marked degree. Dr. McCook introduced a little piece of blotting paper saturated with cologne water into

Animal Intelligence

the neighborhood of a lot of pavement ants who were engaged in a fierce battle. The effect was immediate. They stopped fighting, letting go of their enemies' legs and bodies at once. In insects the sense of smell is located in the extremity of the legs. Clip these off, and even the carrion fly will fail to discover the putrid flesh, its chosen morsel. Likewise as to the cockroach, bumble-bee, crawfish, and other animals. In the snail the sense of smell is located in the horns. In shell-fish it is found in the little seam of flesh near the parting of the shells. In worms it is located in little pits or depressions. Starfish can scent the oyster, its chosen article of food, at a distance of several hundred yards.

HEARING.—The horse and deer have the keenest sense of hearing. Some animals, such as the dog, will howl with misery when certain notes are struck; e. g., tenor D. Birds also have a very delicate sense of hearing. Note how the thrush listens for worms in the early summer morning. Observe also the astounding accuracy with which some birds imitate the songs of other birds. Fishes are especially dull as to the sense of hearing, though carp in the royal park at Potsdam, in Germany, come to be fed at the sound of a bell. But in this case it is not clearly proven that the person who came to feed them was hidden from sight. Even animals so low in the scale as jelly-fish and medusa have organs of hearing. Shell-fish also hear. In the lobster and crawfish the end-organs of hearing are found at the little ending branches of the leg. This is also the case with most insects. The capricorn beetle will, on hearing a sound, hold its antennules erect while intently listening for further developments. The mosquito hears by means of organs located in its hair-like legs. Some insects, the cricket, for example, can certainly hear sounds pitched higher than the compass of the human ear.

SIGHT.—In many animals the acuteness of vision is remarkable. Dogs can be taught to distinguish between variously colored cards. Insect-eating mammals have a well-developed color-sense. Bulls have a strong color antipathy. Birds have the keenest sense of vision of all the animals. The swift will detect the minute insects that constitute its food as they crawl on the ground below. Even barn-yard fowls will detect with astonishing accuracy the difference between sand grains and crumbs of food. At near distances certain reptiles see with remarkable clearness. The chameleon is a striking example. Also frogs and toads use a keen sense of vision in capturing the insects they eat. Fish seem to be unable to distinguish worms at a greater horizontal distance than four feet. Insects, especially those with compound eyes, can readily distinguish between colors. John Lubbock found that if he brought a bee to some honey on a glass placed on a bit of blue paper, having also placed about three feet away some honey on a bit of glass over yellow paper, no matter how often the papers were changed or where placed, the bee would always come to the bit of honey that

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happened to be placed over the bit of blue paper. As Lubbock says, "No one can have the slightest doubt as to the bee accurately perceiving the difference between colors." The water flea always prefers the yellows and greens to the blues and reds. In worms, eyes are sometimes present, but more frequently they are absent. In starfish, eyes frequently occur. In medusa they are found on the margin of the umbrella. In most of them, however, sight means merely the ability to distinguish between light and darkness.

MUSCLE SENSE.—The muscle sense is well developed in most animals. That is also true of the organic sense of hunger and thirst. Some animals also possess the sense of rotation.

MEMORY.—Some persons are naturally slow, others quick, with respect to remembering and recalling past experiences. It does not follow that those who are slow are really inferior in mental power. Sharp, quick, ready boys and girls do not always make strong original thinkers. So some animals may seem to be very slow in exercising their powers of recollection, and yet stand rather high in the scale of intelligence. In the first place it should be noticed that with animals as with men, those ideas that are associated with some strong feeling of pleasure or pain—ideas that are tinged with emotion—are those that are best remembered. Observation plainly shows that some animals have remarkably tenacious memories. Even a very young chick once being stung by a hive bee will ever after avoid taking a bee into its bill, in this way manifesting a memory similar to that of a child, who after having been burnt, avoids the fire. Darwin's dog recognized him on his return after a five years' voyage round the world. Some dogs learn rapidly, but soon forget the tricks one has taught them. Circus-trained dogs are usually slow in learning, but are more valuable because they retain impressions so tenaciously. Captain Shipp gave an elephant a sandwich of cayenne pepper. He then waited six weeks before again visiting the animal, and when he went into the stable he began to fondle the elephant, as had always been his custom. Watching his opportunity the elephant filled his trunk with water, and drenched the captain from head to foot. This seems to be an excellent example of definite memory of a specific occurrence.

REASONING.—Do animals reason? In attempting to answer this question we must clearly define what is meant by reasoning. As Morgan says, "If we apply the term 'reasoning' to that process by which an animal, profiting by experience adapts his actions to somewhat differing conditions, there can be no hesitation in saying that animals do reason." We are also warranted in going further. Animals also draw inferences. You may have seen the horse you were driving make a start forward as he hears the whip drawn from the socket; he has an image of the pain caused by the sting of the lash even before feeling it again, and infers that if he does not trot faster he will feel the painful cut of the whip. Is the proc-

Animal Worship

ess going on in the mind of the horse very different from that of the school-boy who hears his teacher take the whip from its resting place over the blackboard? See how quickly he leaves off his misdeemeanor, turns round in his seat, sits erect, seemingly focuses his attention on his lesson and looks innocent. I remember, when yet a boy, of strolling one morning along the banks of the White River at Indianapolis. Soon I noticed that a blind horse had wandered into the river, and, getting beyond his depth, was in danger of drowning; for he could not tell in which direction the shore lay. Men planning to save him were seeking for boats and a rope with which to go to his rescue. At this juncture a saddle horse which had been left standing in front of a store near the bank, hearing the piteous sounds of the blind horse, galloped to the water's edge and then swam to the bewildered and struggling animal, taking hold of the mane with his teeth, led the sinking horse to the opposite bank where it was easier to land than at the one whence he had come. This seems to me a mental process very akin to reasoning in man.

The mental states of animals are more naive and not so interrelated and complex as our own, and can therefore be traced to their origin and sources much better and more readily than is possible with our own activities. Mr. Romanes records an interesting observation of which one of his dogs was the subject, and which, since it is typical of its kind, we may here briefly consider. The dog was cowed by the sound of apples being rolled on the floor of the loft above the stable; but when Mr. Romanes took the dog up into the loft and let him see what was going on, he seemed not to be disquieted by the noise. In his index Mr. Romanes enters this under the heading, "Appreciation of cause by the dog." If the dog really perceived the relation of causation as such, he had rational grounds for ceasing to be disquieted. Such illustrations as these, despite the severest criticism, seem to show a wonderful intelligence and even reasoning in animals. W. O. KROHN.

Animals. Cruelty to, an offense against which societies have been formed and laws passed in England and other countries. The American society for its prevention owes its existence to the lifelong endeavors of Henry Bergh.

Animal Worship, a practise found to prevail, or to have prevailed, in the most widely distant parts of the world, both the Old and the New, but nowhere to such an amazing extent as in ancient Egypt, notwithstanding its high civilization. Nearly all the more important animals found in the country were regarded as sacred in some part of Egypt, and the degree of reverence paid to them was such that throughout Egypt the killing of a hawk or an ibis, whether voluntary or not, was punished with death. The worship, however, was not, except in a few instances, paid to them as actual deities. The animals were merely regarded as sacred to the deities, and the worship paid to them was symbolical.

Anise

Anise (an'is), an annual plant, a native of the Levant, and cultivated in Spain, France, Italy, Malta, etc., whence the fruit popularly called *aniseed*, is imported. It has an aromatic smell, and is largely employed to flavor liquors (aniseed or anisette), sweetmeats, etc. *Star-anise* is the fruit of an evergreen Asiatic tree, and is brought chiefly from China. An essential oil is obtained from both kinds of anise, and is used in the preparation of cordials, for scenting soaps, etc.

Anjou (än-zhō), an ancient province of France, now forming the department of Maine-et-Loire, and parts of the departments of Indre-et-Loire, Mayenne, and Sarthe. Area about 3,000 sq. mi. In 1060 the province passed into the hands of the house of Gatinais, of which sprang Count Godfrey V who, in 1127, married Matilda, daughter of Henry I of England, and so became the ancestor of the Plantagenet kings. Anjou remained in the possession of the English kings up to 1204, when John lost it to the French king Philip Augustus. In 1226 Louis VIII bestowed this province on his brother Charles; but in 1328 it was remitted to the French crown. John I raised it to the rank of a ducal peerage, and gave it to his son Louis. Henceforth it remained separate from the French crown till 1480, when it fell to Louis XI.

Anna Comne'na (1083-1148), daughter of Alexius Comnenus I, Byzantine emperor. After her father's death she endeavored to secure the succession to her husband, Nicephorus Briennius, but was baffled by his want of energy and ambition. She wrote (in Greek) a life of her father Alexius, which, in the midst of much fulsome panegyric, contains some valuable and interesting information. She forms a character in Sir Walter Scott's *Count Robert of Paris*.

Anna Ivanov'na (1693-1740), empress of Russia; the daughter of Ivan, the elder half-brother of Peter the Great. She was married in 1710 to the Duke of Courland, in the following year was left a widow, and in 1730 ascended the throne of the czars on the condition proposed by the senate, that she would limit the absolute power of the czars, and do nothing without the advice of the council composed of the leading members of the Russian aristocracy. But no sooner had she ascended the throne than she declared her promise null, and proclaimed herself autocrat of all the Russias. She chose as her favorite Ernest John von Biren (or Biron), who was soon all-powerful in Russia, and ruled with great severity. Several of the leading nobles were executed, and many thousand men exiled to Siberia. In 1737 Anna forced the Courlanders to choose Biren as their duke, and nominated him at her death regent of the empire during the minority of Prince Ivan (of Brunswick).

Annap'olis, capital of Maryland, on the Severn, near its mouth in Chesapeake Bay. It contains a college (St. John's), a state-house, and the U. S. naval academy. Pop. 8,525.

Annap'olis, a small town in Nova Scotia, on an inlet of the Bay of Fundy, with an im-

Annealing

portant herring-fishery. It is one of the oldest European settlements in America, dating from 1604.

Ann Arbor, Washtenaw co., Mich., on Huron river, 38 mi. w. of Detroit. Railroads: Michigan Central; Ann Arbor Ry. Industries: furniture factory, three flouring mills, two agricultural implement works. Surrounding country agricultural. It is the seat of the University of Michigan. Pop. 1900, 14,509.

Annat'to (Arnot'to), an orange-red coloring matter, obtained from the pulp surrounding the seeds of a shrub native to tropical America, and cultivated in Guiana, St. Domingo, and the East Indies. It is sometimes used as a dye for silk and cotton goods though it does not produce a very durable color, but it is much used in medicine for tinging plasters and ointments, and to a considerable extent by farmers for giving a rich color to cheese.

Anne (1664-1714), Queen of Great Britain and Ireland, was born at Twickenham, near London. She was the second daughter of James II, then Duke of York, and Anne, his wife, daughter of the Earl of Clarendon. With her father's permission she was educated according to the principles of the English Church. In 1683 she was married to Prince George, brother to King Christian V of Denmark. On the arrival of the Prince of Orange in 1688, Anne wished to remain with her father; but she was prevailed upon by Lord Churchill (afterward Duke of Marlborough) and his wife to join the triumphant party. After the death of William III in 1702 she ascended the English throne. Her character was essentially weak, and she was governed first by Marlborough and his wife, and afterwards by Mrs. Masham. Most of the principal events of her reign are connected with the war of the Spanish Succession. The only important acquisition that England made by it was Gibraltar, which was captured in 1704. Another very important event of this reign was the union of England and Scotland under the name of Great Britain, which was accomplished in 1707. The reign of Anne was distinguished not only by the brilliant successes of the British arms, but also on account of the number of admirable and excellent writers who flourished at this time, among whom were Pope, Swift, and Addison. Anne bore her husband many children, all of whom died in infancy except one son, the Duke of Gloucester, who died at the age of twelve.

Annealing (an-ēl'ing), a process to which many articles of metal and glass are subjected after making, in order to render them more tenacious, and which consists in heating them and allowing them to cool slowly. When the metals are worked by the hammer, or rolled into plates, or drawn into wire, they acquire a certain amount of brittleness, which destroys their usefulness and has to be remedied by annealing. The tempering of steel is one kind of annealing. Annealing is particularly employed in glass-houses, and consists in putting the glass vessels, as soon as they are formed and while they are yet hot, into a furnace or

Annélida

oven, in which they are suffered to cool gradually. The toughness is greatly increased by cooling the articles in oil.

Annél'ida, an extensive division or class of articulate animals. The earthworm, the lobworm, and the leech belong to this division.

Anniston, county-seat of Calhoun co., Ala., among the mountains of the Blue Ridge; on the Southern and the Louisville & Nashville railroads. It is in a coal and iron, timber and cotton region and the center of a great cotton trade; has foundries, machine shops and rolling mills; car, locomotive, iron, pipe and boiler works; and manufactures of cotton goods, lime, brick, tile and lumber. It is the seat of the Noble Institute, of a woman's college and Barber Memorial Seminary for colored girls. The town was founded in 1873. Pop. 1900, 9,675.

Annobon, small island in the Gulf of Guinea, belonging to Spain. Pop. 3,000.

Annonay (ân-o-nâ), a town in southern France, department of Ardèche, 37 mi. s.s.w. of Lyons. It is the most important town of Ardèche, manufacturing paper and glove leather to a large extent, also cloth, felt, silk stuffs, gloves, hosiery, etc. There is an obelisk in memory of Joseph Montgolfier of balloon fame, a native of the town. Pop. 14,549.

Annu'ity, a sum of money paid annually to a person and continuing either a certain number of years, or for an uncertain period to be determined by a particular event, as the death of the recipient (or annuitant) or that of the party liable to pay the annuity; or the annuity may be perpetual. The payments are made at the end of each year, or semi-annually, or at other periods. An annuity is usually raised by the present payment of a certain sum as a consideration whereby the party making the payment, or some other person named by him, becomes entitled to an annuity, and the rules and principles by which this present value is to be computed have been the subjects of careful investigation. The present value of a perpetual annuity is evidently a sum of money that will yield an interest equal to the annuity, and payable at the same periods; and an annuity of this description, payable quarterly, will evidently be of greater value than one of the same amount payable annually, since the annuitant has the additional advantage of the interest on three of the quarterly payments until the expiration of the year. In other words, it requires a greater present capital to be put at interest to yield a given sum per annum, payable quarterly, than to yield the same annual sum payable at the end of each year. The present value of an annuity for a limited period is a sum which, if put at interest, will at the end of that period give an amount equal to the sum of all the payments of the annuity and interest; and accordingly, if it be proposed to invest a certain sum of money in the purchase of an annuity, for a given number of years, the comparative value of the two may be precisely estimated, the rate of interest being given. But annuities for uncertain periods,

Anquetil-Duperron

and particularly life annuities, are more frequent, and the value of the annuity is computed according to the probable duration of the life by which it is limited. Such annuities are often created by contract, whereby the government or a private annuity office agrees, for a certain sum advanced by the purchaser, to pay a certain sum in yearly, quarterly, or other periodical payments, to the person advancing the money, or to some other named by him, during the life of the annuitant. Or the annuity may be granted to the annuitant during the life of some other person, or during two or more joint lives, or during the life of the longest liver or survivor among a number of persons named. If a person having a certain capital, and intending to spend this capital and the income of it during his own life, could know precisely how long he should live, he might lend this capital at a certain rate during his life, and by taking every year, besides the interest, a certain amount of the capital, he might secure the same annual amount for his support during his life in such manner that he should have the same sum to spend every year, and consume precisely his whole capital during his life. But since he does not know how long he is to live, he agrees with the government or an annuity office to take the risk of the duration of his life, and the office agrees to pay him a certain annuity during his life in exchange for the capital which he proposes to invest in this way. The probable duration of his life therefore becomes a subject of computation; and for the purpose of making this calculation, tables of longevity are made by noting the proportions of deaths at certain ages in the same country or district. In the U. S. the granting of annuities is conducted by private companies or corporations. The following are the approved rates of the best managed companies: In consideration of \$1,000 paid to a company the annuity granted to a person aged 40 would be \$52.75; aged 45, \$58.10; aged 50, \$64.70; aged 55, \$73.50; aged 60, \$86.20; aged 65, \$100; aged 70, \$123.45; aged 75, \$145.95; aged 80, \$180.15. The purchase of annuities, as a system, has never gained much foothold in the U. S.—the endowment plan of life insurance, by which after the lapse of a term of years the insured receives a sum in bulk, being preferred. In England the granting of annuities is conducted by the government.

An'ode, the positive pole of the voltaic current, being that part of the surface of a decomposing body which the electric current enters; opposed to *cathode*, the way by which it departs.

Anquetil-Duperron (ânk-têl-du-pâ-ron), ABRAHAM HYACINTHE (1731-1805), a French Orientalist. His zeal for the Oriental languages induced him to set out for India, where he prevailed on some of the Parsee priests to instruct him in the Zend and Pehlevi and to give him some of the Zoroastrian books. In 1762 he returned to France with a valuable collection of MSS. In 1771 he published his *Zend-Avesta*, a translation of the

Ansgar

Vendidad, and other sacred books, which excited great sensation. His knowledge of the Oriental languages was by no means exact.

Ansgar (or Anshar) (801-865), called the "Apostle of the North," was born in Picardy, and took the monastic vows while still in his boyhood. In the midst of many difficulties he labored as a missionary in Denmark and Sweden; obtaining the reputation of having undertaken, if not the first, the most successful attempts for the propagation of Christianity in the North.

An'son, GEORGE, LORD (1697-1762), celebrated English navigator. He entered the navy at an early age and became a commander in 1722, and captain in 1724. His adventures and discoveries are described in the well-known *Anson's Voyage*, compiled from materials furnished by Anson.

Ansonia, New Haven co., Conn., on Naugatuck River, 12 mi. n.w. of New Haven. Railroads: Naugatuck and Berkshire division, consolidated system. Industries: iron foundry, brass and copper foundry, clock, eyelet, dial factories, and other smaller industries. Surrounding country agricultural. Was first settled about 1845 and became a city about 1890. Pop. 1900, 12,681.

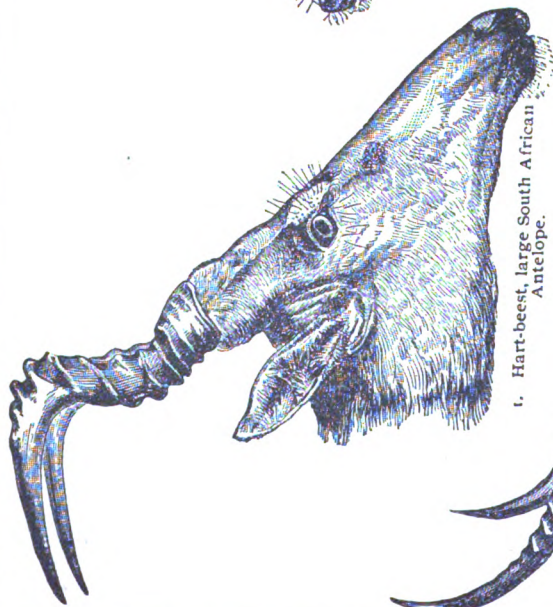
Anspach (ân'spâh) (or Ansbach), a town in Bavaria, 24 mi. s.w. of Nürnberg. Anspach gave its name to an ancient principality or margravate, which had a territory of about 1,300 sq. mi., with 300,000 inhabitants, in the end of the eighteenth century. The last margrave sold his possessions in 1791 to Prussia. It was occupied by the French in 1806, and transferred by Napoleon to Bavaria. The town has manufactures of trimmings, buttons, straw-ware, etc. Pop. 14,195.

Ant, a familiar insect related to bees and wasps. Various kinds are found in most temperate and tropical regions. They are small but powerful insects, and have long been noted for their remarkable intelligence and interesting habits. They live in communities regulated by definite laws, each member of the society bearing a well-defined and separate part of the work of the colony. Each community consists of males; of females much larger than the males; and of barren females, otherwise called neuters, workers, or nurses. The neuters are wingless, and the males and females only acquire wings for their "nuptial flight," after which the males perish, and the few females which escape the pursuit of their numerous enemies, divest themselves of their wings, and either return to establish nests, or become the foundresses of new colonies. The neuters perform all the labors of the ant-hill or abode of the community; they excavate the galleries, procure food, and feed the larvæ or young ants, which are destitute of organs of motion. In fine weather they carefully convey them to the surface for the benefit of the sun's heat, and as attentively carry them to a place of safety either when bad weather is threatened, or the ant-hill is disturbed. In like manner they watch over the safety of the nymphs or pupæ about to

Ant

acquire their perfect growth. Some communities possess a special type of neuters, known as "soldiers," from the duties that especially fall upon them, and from their powerful biting jaws. There is a very considerable variety in the materials, size, and form of ant-hills, or nests, according to the peculiar nature or instinct of the species. Most of American ants form nests in woods, fields, or gardens, their abodes being generally in the form of small mounds rising above the surface of the ground and containing numerous galleries and apartments. Some excavate nests in old tree trunks. Houses built by the common wood-ant are frequently as large as a small hay-cock. Some ants live on animal food, very quickly picking quite clean the skeleton of any dead animal they may light on. Others live on saccharine matter, being very fond of the sweet substance called honeydew, which exudes from the bodies of Aphides, or plant-lice. These they sometimes keep in their nests, and sometimes tend on the plants where they feed; sometimes they even superintend their breeding. By stroking the Aphides with their antennæ they cause them to emit the sweet fluid, which the ants then greedily sip up. Various other insects are looked after by ants in a similar manner, or are found in their nests. It has been observed that some species, like the Sanguinary Ant, resort to violence to obtain working ants of other species for their own use, plundering the nests of suitable kinds of their larvæ and pupæ, which they carry off to their own nests to be carefully reared and kept as slaves. In temperate countries male and female ants survive, at most, till autumn, or to the commencement of cool weather, though a very large proportion of them cease to exist long previous to that time. The neuters pass the winter in a state of torpor, and of course require no food. The only time when they require food is during the season of activity, when they have a vast number of young to feed. Some ants of Southern Europe feed on grain, and store it up in their nests for use when required. Some species have stings as weapons, others only their powerful mandibles, or an acrid and pungent fluid (formic acid) which they can emit. The name ant is also given to the neuropterous insects otherwise called Termites.

There is a family of ants which pays particular funeral honors to the dead. Whenever one of their number is found dead the whole number of occupants of the ant-hill is notified, and they turn out *en masse* to convey the deceased member to his last resting-place. They proceed slowly two-by-two to the place where the dead is lying. Two ants take up the dead one and march off, followed by two others as mourners. These two empty-handed followers relieve their fellows in advance, the latter following behind in the place of those who relieve them, continuing to alternate from time to time. When they have reached the place of burial, about half the number take part in digging the grave. The dead body is



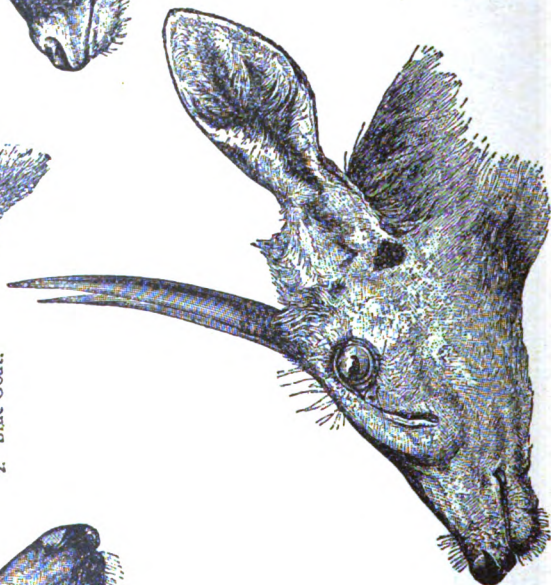
1. Hart-beest, large South African Antelope.



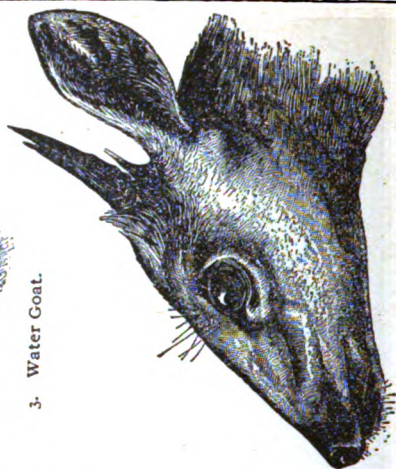
2. Blue Goat.



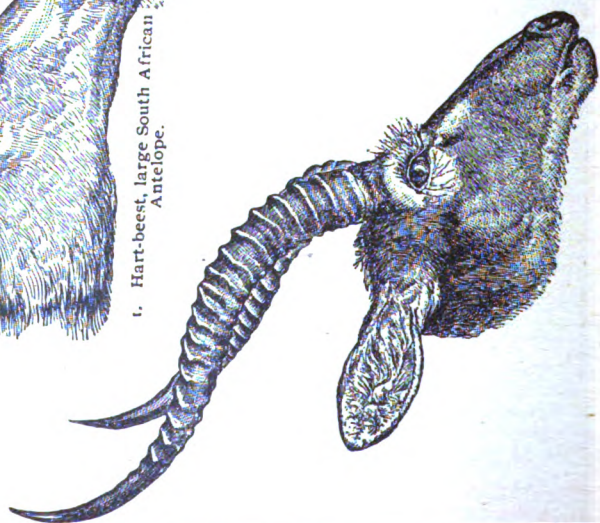
3. Water Goat.



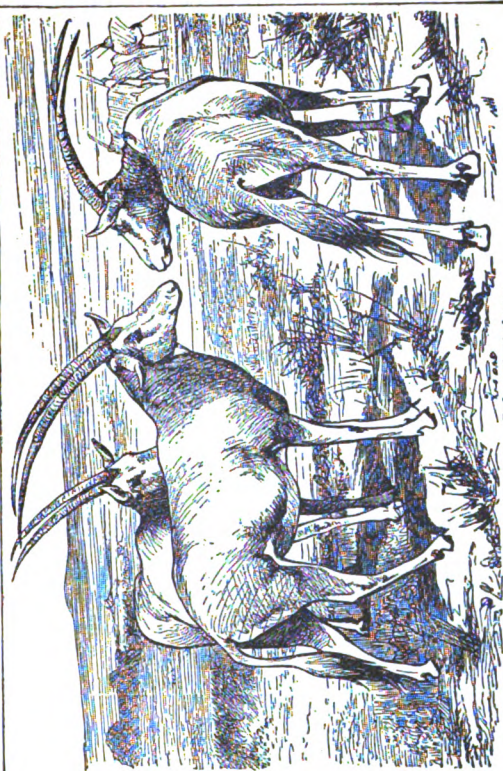
5. Cephalophus or Bushbuck.



6. Cephalophus or fierce Bushbuck.



4. Beautiful Goat.



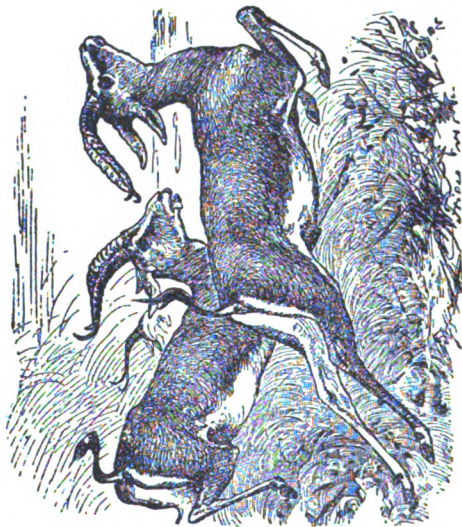
2. Saiga Antelope.



1. Long-horned Antelope.



5. Saiga, Siberian Antelope.



4. Gazelle.



3. Chamois.

Antæus

laid in and the other half of the ants cover it up. In one instance which was observed, about a half dozen ants did not take part in the ceremonies, standing idly by, and on these the others fell and killed them, and buried them, not in separate graves, but all in one large pit. The ants then all paired off, marched back to the place where they found the dead, and after a few minutes, retired to their own habitations.

There is another peculiar ant known as the umbrella or parasol ant on account of the curious habit it has of carrying a leaf in its mouth. The stem of the leaf is held in the



Umbrella Ant.

mouth, and the palm extends back over the head. These leaves are employed in house building. In the accompanying illustration is shown an umbrella ant on the march.

Antæ'us, the giant son of Poseidon (Neptune) and Gē (the Earth), who was invincible so long as he was in contact with the earth. Heracles (Hercules) grasped him in his arms and stifled him suspended in the air.

Antananarivo (an-tan-an-a-rē'-vō), the capital of Madagascar. It contained two royal palaces, immense timber structures, one of which has been lately surrounded with a massive stone veranda with lofty corner towers. It has manufactures of metal work, cutlery, silk, etc., and exports sugar, soap, and oil. Pop. about 100,000.

Antarctic (ant-ärk'tik), relating to the southern pole or to the region near it. The *Antarctic Circle* is a circle parallel to the equator and distant from the south pole 23° 28', marking the area within which the sun does not set when on the Tropic of Capricorn. The Antarctic Circle has been arbitrarily fixed on as the limits of the Antarctic Ocean, it being the average limit of the pack-ice; but the name is often extended to embrace a much wider area. The lands in or near the Antarctic Circle are but imperfectly known, the work of exploration having been hitherto baffled by what seems an unsurmountable ice-barrier. Sir James Ross reached the highest south latitude yet attained in 1841-42, discovering Victoria Land, with its volcanoes, Erebus (12,400

Antennæ

ft.) and Terror (10,900 ft.). The South Shetland Islands, Enderby Land, Graham's Land etc., have also been discovered in this ocean.

Ant-eater, a name given to mammals of various genera that prey chiefly on ants, but usu-



Great Ant-eater.

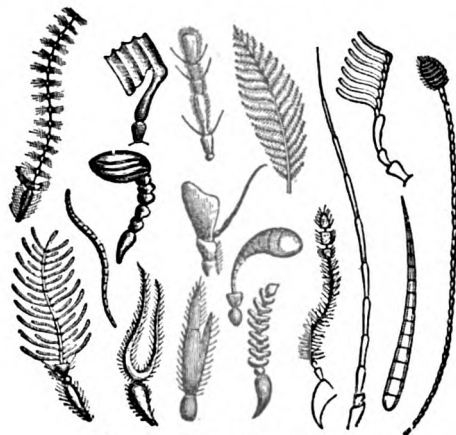
ally confined to one genus of the toothless order. In this genus the head is remarkably elongated, the jaws destitute of teeth, and the mouth furnished with a long extensile tongue covered with glutinous saliva, by the aid of which the animals secure their insect prey. The eyes are particularly small, the ears short and round, and the legs, especially the anterior, very robust, and furnished with long, compressed, acute nails, admirably adapted for breaking into the ant-hills. The most remarkable species is the ant-bear, a native of the warmer parts of South America. It is from 4 to 5 feet in length from the tip of the muzzle to the origin of the black bushy tail, which is about two feet long. The body is covered with long hair, particularly along the neck and back. It is a harmless and solitary animal, and spends most of its time in sleep. Some are adapted for climbing trees in quest of the insects on which they feed, having prehensile tails. All are natives of South America. The name ant-eater is also given to the pangolins and to the aardvark. The echidna of Australia is sometimes called *porcupine ant-eater*.

An'telope, the name given to the members of a large family of Mammalia, closely resembling the deer in general appearance, but essentially different in nature from the latter animals. They are included with the sheep and oxen in the family of the Cavicornia or "hollow-horned" ruminants. Their horns, unlike those of the deer, are not deciduous, but are permanent; are never branched, but are often twisted spirally, and may be borne by both sexes. They are found in greatest number and variety in Africa. Well-known species are the chamois (European), the gazelle, the addax, the eland, the koodoo, the gnu, the springbok, the sasin or Indian antelope, and the prongbuck of America.

Antennæ (or feelers), the anterior appendages on the head of crustaceans, insects, and myriapods. The lobster has two pairs of feelers, while insects and myriapods have only one pair. The name may also be applied to sensory processes on the head of some marine worms. They are really "head-legs" modified for sensory purposes, and consist of a long

Anthemius

series of joints, sometimes over 100 in number. They are supplied with nerve branches, and are used by the animals for feeling their way, for testing surrounding objects, and apparently for communicating with one another. The olfactory function of the antennæ of the cockroach has been demonstrated, but some insects can smell their food even when robbed of their feelers. The smelling bristles of the blowfly occur very abundantly on the third



Various Forms of Antennæ.

joint of the antennæ. Peculiar sensory cones and knobs occur on the antennæ of some myriapods. The small antennæ of the lobster bear olfactory bristles, and have an ear lodged at the base. And in short there are numerous observations to justify the general statement that in many cases the antennæ are sensitive to smell, sound, and probably taste. Deprived of its antennæ, an ant, for instance, is peculiarly helpless.

Anthe'mius, a Greek mathematician and architect of Lydia; designed the church of St. Sophia at Constantinople, and is credited with the invention of the dome; d. A. D. 534.

Anthol'ogy, the name given to several collections of short poems which have come down from antiquity. The first who compiled a Greek Anthology was Meleager, a Syrian, about 60 B. C. Later collections are that of Constantine Cephalas, in the tenth century, and that of Maximus Planudes, in the fourteenth century. There are also Arabic, Persian, Turkish, etc., anthologies.

An'thon, CHARLES, LL.D. (1797-1867), an American editor of classical school-books, and of works intended to facilitate the study of Greek and Latin literature. He was long a professor in Columbia College, New York.

An'thony, D. R. (1824-1904), a famous Kansas pioneer and editor. His early years were spent in Rochester, New York. In 1854 he removed to Kansas; was lieutenant colonel in the Union army (1862-63); editor of the *Leavenworth Times* for forty years; mayor of Leavenworth from 1862 to 1872; member of the Kansas legislature 1873; postmaster of Leavenworth from

1874 to 1885; and government director of the Union Pacific Railroad in 1886.

An'thony, HENRY BOWEN (1815-1884), born in Coventry, R. I. He graduated in 1833 at Brown University, and edited the *Providence Journal* from 1838 to 1859. He was governor of Rhode Island, 1849-1851, and in 1859 was elected as a Republican to the U. S. Senate. He was four times re-elected to the Senate, and was chosen president *pro tem.* of that body in 1863, 1869, and 1871.

Anthony, SUSAN B. (1820-), a famous advocate of woman's suffrage. In 1852, she organized the first state Women's Temperance Society, and from that time has been active in all branches of work for the advancement of women's rights. In 1869, she organized with Mrs. Stanton the National Woman's Suffrage Association.

An'thracite. See *Coal*.

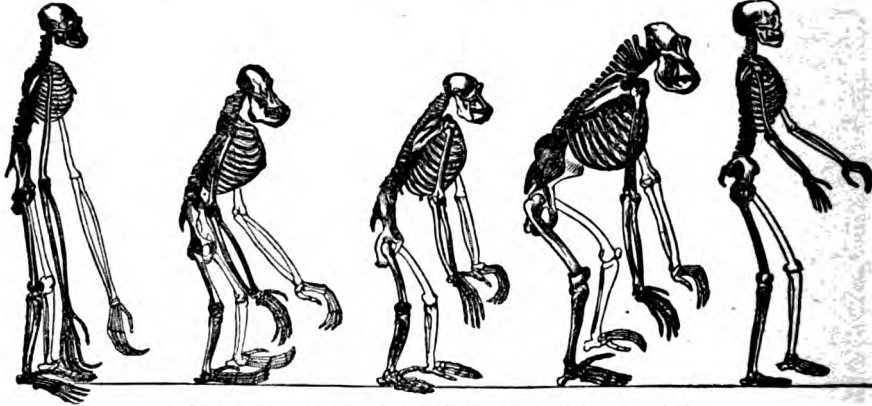
An'thrax, a fatal disease to which cattle, horses, sheep, and other animals are subject, always associated with the presence of an extremely minute micro-organism in the blood. It frequently assumes an epizootic form, and extends over large districts, affecting all classes of animals which are exposed to the exciting causes. It is also called splenic fever, and is communicable to man, appearing as carbuncle, malignant pustule, or wool-sorter's disease.

Anthropoid Apes, the highest and most man-like monkeys, including Gorilla, Chimpanzee, Orang-utan, Gibbon, and several other species. They are technically described by the Linnæan title Anthropomorpha, and readily distinguished, as tailless, semi-erect, and long-armed, from the dog-like apes, which have also a narrow partition between the nostrils, and also inhabit the Old World. With the decidedly lower flat-nosed New-World monkeys, there is no possibility of confusion. The anthropoid apes are all arboreal, and inhabit Africa, Southeastern Asia, and the Malay Archipelago. In all, about a dozen species have been described with more or less definiteness. The family is of special interest and importance in connection with the views held by evolutionists as to the descent of man. It is recognized by anatomists that all the attempts to establish a fundamental distinction, on anatomical grounds, between the physical structure of the higher apes and that of man are futile. Generic differences, indeed, there are in abundance, but these establish only a difference of degree, and not of kind. Thus, in man, the great toe is not opposable to the others for grasping purposes, the angle between the face and the top of the skull does not exceed 120°, the teeth form an uninterrupted series, and so on; while the strong spines on the back of the gorilla's neck, the very marked eyebrow ridges in gorilla and chimpanzee, the especially long arms of the gibbon, and the protruding jaws of all the anthropoids, are equally characteristic adaptations to different ways of life. Even in the minutiae of blood-vessels, muscles, nerves, and brain-convolutions, impartial observers have

Anthropology

lemonstrated the closest resemblance. The difference of structure between the lowest monkeys and the higher are far greater than those between man and any anthropoid ape, the resemblance being especially obvious when young forms are compared. In their expressions of cerebral activity, whether intellectual or emotional, the anthropoids come in some respects very near the lowest human tribes.

On the other hand, while it is impossible to establish any fundamental distinction in physical structure between Homo and the Anthropomorpha, there is among evolutionists an equal consensus of opinion as to the impossi-



Skeletons of Anthropoid Apes Compared with that of Man.

bility of regarding an ape of any existing anthropoid species as in the direct line of human ancestry. As regards brain-structure, the most man-like ape is the orang, while the chimpanzee has the most closely related skull, the gorilla the most human feet and hands, the gibbon the most similar chest. The study of anthropoid fossils has not yet discovered the remains of any form which can be accepted as the "missing link," although extinct anthropoids, such as *Dryopithecus*, unquestionably serve to lessen the distance to be bridged over.

Anthropol'ogy, the science of man and mankind, including the study of man's place in nature, that is, of the measure of his agreement with and divergence from other animals; of his physical structure and psychological nature, together with the extent to which these act and react on each other; and of the various tribes of men, determining how these may have been produced or modified by external conditions, and consequently taking account also of the advance or retrogression of the human race. It puts under contribution all sciences which have man for their object, as archæology, comparative anatomy, physiology, psychology, climatology, etc. See *Ethnology*.

An'tichrist, a word occurring in the first and second epistles of St. John, and nowhere else in Scripture, in passages having an evident reference to a personage, real or sym-

Antigonus

bolical, mentioned or alluded to in various other passages both of the Old and New Testament

Anticos'ti, an island of Canada, in the mouth of the St. Lawrence, 125 mi. long by 30 mi. broad. The interior is mountainous and wooded, but there is much good land, and it is well adapted for agriculture. The fisheries are valuable. The population is scanty, however.

Antietam (an-tē'tam), a small stream in Maryland which falls into the Potomac about 50 mi. n.w. of Washington; scene of a battle between the Federal and Confederate armies, Sept. 17, 1862. The Union army numbered

87,000 under General McClellan while Gen. R. E. Lee commanded some 70,000 Confederate soldiers. After two days' fighting the Confederates asked for an armistice to bury their dead and then retreated across the Potomac. The Union loss was about 12,500 killed, wounded, and missing, while the Confederates, having the advantage of shelter in the woods, lost about 9,000.

Antifriction Metal, a name given to various alloys of tin, zinc, copper, antimony, lead, etc., which oppose little resistance to motion, with great resistance to the effects of friction, so far as concerns the wearing away of the surfaces of contact. Babbitt's metal (50 parts tin, 5 antimony, 1 copper) is one of them.

Antigone (an-tig'o-nē), in Greek mythology, the daughter of Œdipus and Jocasta, celebrated for her devotion to her father and to her brother Polynices, for burying whom, against the decree of King Creon, she suffered death. She is heroine of Sophocles's *Œdipus at Colonus* and his *Antigone*; also of Racine's tragedy, *Les Freres Ennemis*.

Antig'onish, a town in the e. of Nova Scotia, in county of the same name; the seat of a Roman Catholic bishop, with a cathedral, a college, and a good harbor. Pop. 3,500.

Antig'onus, one of the generals of Alexander the Great, born about 382 B. C. After the death of Alexander, Antigonus obtained Greater Phrygia, Lycia, and Pamphylia as

Antigua

his dominion. Ptolemy, Cassander, and Lysimachus, alarmed by his ambition, united themselves against him; and a long series of contests ensued in Syria, Phœnicia, Asia Minor, and Greece, ending in 301 B. C. with the battle of Ipsus in Phrygia, in which Antigonus was defeated and slain.—**ANTIGONUS GON' ATAS**, son of Demetrius Poliorcētēs, and grandson of the above, succeeded his father in the kingdom of Macedon and all his other European dominions; died after a reign of forty-four years, B. C. 239.

Antigua (an-tē'ga), one of the British West Indies, the most important of the Leeward group. Area 108 sq. mi. Discovered by Columbus, 1493. Its shores are high and rocky; the surface is varied and fertile. The capital, St. John, the residence of the governor of the Leeward Islands, stands on the shore of a well-sheltered harbor in the n. w. part of the island. The staple articles of export are sugar, molasses, and rum. Pop. (including Barbuda), 34,964.

Anti-Lebanon, the eastern of the two parallel ranges known as the Mountains of Lebanon in Palestine.

An'timony, a brittle metal of a bluish-white or silver-white color, and a crystalline or laminated structure. It melts at 842° F., and burns with a bluish-white flame. The mineral called stibnite or antimony-glance, is a tri-sulphide, and is the chief ore from which the metal is obtained. It is found in many places, including Mexico, France, Spain, Hungary, Italy, Canada, Australia, and Borneo. The metal, or as it was formerly called, the *regulus of antimony*, does not rust or tarnish when exposed to the air. When alloyed with other metals it hardens them, and is therefore used in the manufacture of alloys, such as Britannia-metal, type-metal, and pewter. In bells it renders the sound more clear; it renders tin more white and sonorous as well as harder, and gives to printing types more firmness and smoothness. The salts of antimony are very poisonous. The protoxide is the active base of tartar emetic and James's powder, and is justly regarded as a most valuable remedy in many diseases. *Yellow antimony* is a preparation of antimony of a deep yellow color, used in enamel and porcelain painting. It is of various tints, and the brilliancy of the brighter hues is not affected by foul air.

Antino'mianism ("opposition to the law"), the name given by Luther to the inference drawn by John Agricola from the doctrine of justification by faith, that the moral law is not binding on Christians as a rule of life. The term antinomian has since been applied to all doctrines and practises which seem to condemn or discountenance strict moral obligations. The Lutherans and Calvinists have both been charged with antinomianism; the former on account of their doctrine of justification by faith, the latter both on this ground and that of the doctrine of predestination. The charge is, of course, vigorously repelled by both.

Antinous (an-tin'o-us), a young Bithynian whom the extreme love of Hadrian has im-

Antipope

mortalized. He drowned himself in the Nile in 122 A. D. Hadrian set no bounds to his grief for his loss. He gave his name to a newly-discovered star, erected temples to his honor, called a city after him, and caused him to be adored as a god throughout the empire. Statues, busts, etc., of him are numerous.

Antioch (an'ti-ok), a famous city of ancient times, the capital of the Greek kings of Syria, on the left bank of Orontes, about 21 mi. from the sea, in a beautiful and fertile plain; founded by Seleucus Nicator in 300 B. C., and named after his father Antiochus. In Roman times it was the seat of the Syrian governors, and the center of a widely-extended commerce. It was called the "Queen of the East," and "The Beautiful." Antioch is frequently mentioned in the New Testament, and it was here that the disciples of our Saviour were first called Christians (Acts 11 : 26). In the first half of the seventh century it was taken by the Saracens, and in 1098 by the Crusaders. They established the principality of Antioch, of which the first ruler was Bohemond, and which lasted till 1268, when it was taken by the Mameluke sultan of Egypt. In 1516 it passed into the hands of the Turks. The modern Antioch, or Antakieh, occupies but a small portion of the site of the ancient Antioch. Pop. est. 10,000. There was another Antioch, in Pisidia, at which Paul preached on his first missionary journey.

Antiochus (an-ti'o-kus), a name of several Græco-Syrian kings of the dynasty of the Seleucidae, who reigned B. C. 324-164.

Antioquia (ân-tē-ō-kē'ā), a town of South America, in Colombia, on the River Cauca; founded in 1542. Pop. 10,000. It gives name to a department of the republic. Area 22,316 sq. mi.; pop. 365,974. Capital, Medellín.

Antip'ater, a general and friend of Philip of Macedon, father of Alexander the Great. On the death of Alexander, in 323 B. C., the regency of Macedonia was assigned to Antipater, who succeeded in establishing the Macedonian rule in Greece on a firm footing. He died in B. C. 317 at an advanced age.

An'tiphon, a Greek orator, born near Athens; founder of political oratory in Greece. His orations are the oldest extant, and he is said to have been the first who wrote speeches for hire. He was put to death for taking part in the revolution of B. C. 411, which established the oligarchic government of the Four Hundred.

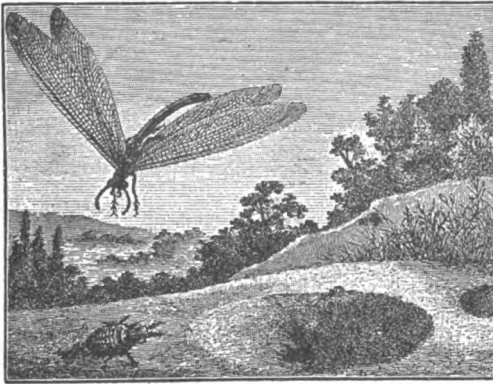
An'tipope, the name applied to those who at different periods have produced a schism in the Catholic Church by opposing the authority of the pope, under the pretense that they were themselves popes. The first antipope is reputed to be Laurentius, elected in 498 in opposition to Symmachus. Several emperors of Germany set up antipopes. Thus, Henry IV elevated to the papal chair Guibert of Ravenna under the title of Clement III in opposition to Gregory VII. During the twelfth century there were several antipopes, notably Gregory VIII, antipope to Gelasius II, and Honorius III, antipope to Alexander II. After

Antiseptic

the death of Gregory XI, the French cardinals objected to the election of Urban VI and, withdrawing to Provence, set up Clement VII as antipope, thus creating in the church what was known as the "great schism of the west." The last antipope was Felix V, a Duke of Savoy (1439-1449).

Antiseptic, any substance by which the putrefaction of vegetable or animal matter is prevented or arrested. There are a great number of substances having this preservative property, among which are salt, alcohol, vegetable charcoal, creosote, corrosive sublimate, tannic acid, sulphurous acid, sulphuric ether, chloroform, arsenic, wood-spirit, aloes, camphor, benzine, aniline, etc. The packing of fish in ice, and the curing of herring and other fish with salt, are familiar antiseptic processes. The different antiseptics act in different ways. The term is applied in a specific manner to that mode of treatment in surgery by which air is excluded from wounds, or allowed access only through substances capable of destroying the germs in the atmosphere on whose presence supuration is assumed to depend.

Ant-lion, the larva of a Neuropterous insect which in its perfect state greatly resembles a dragon-fly; curious on account of its ingenious method of catching the insects—chiefly ants—on which it feeds. It digs a funnel-shaped hole in the driest



Ant-lion.

and finest sand it can find, and when the pit is deep enough, and the sides are quite smooth and sloping, it buries itself at the bottom with only its formidable mandibles projecting, and waits till some luckless insect stumbles over the edge, when it is immediately seized, its juices sucked, and the dead body jerked from the hole.

Antofagas'ta, a Chilean seaport on the Bay of Morena; and a territory of the same name recently taken from Bolivia. The territory has an area of 60,988 sq. mi. and a pop. of 21,213. The port is connected by railway with the silver mines of Caracoles, and

Antoninus

exports silver, copper, cubic niter, etc. Pop 7,946.

Antoinette (ân-twâ-net), MARIE (Marie Antoinette Joseph Jeanne de Lorraine) (1755-1793), Archduchess of Austria and Queen of France, the youngest daughter of the Emperor Francis I and of Maria Theresa, was born at Vienna, executed at Paris. She was married at the age of fifteen to the Dauphin, afterward Louis XVI, but her manners were ill-suited to the French court, and she made many enemies among the highest families by her contempt for its ceremonies, which excited her ridicule. The freedom of her manners, indeed, even after she became queen, was a cause of scandal. The extraordinary affair of the diamond necklace, in which the Cardinal Louis de Rohan, the great quack Cagliostro, and a certain Countess de Lamotte were the chief actors, tarnished her name, and added force to the calumnies against her. Though it was proved in the examination which she demanded that she had never ordered the necklace, her enemies succeeded in casting a stigma on her, and the credulous people laid every public disaster to her charge. There is no doubt she had great influence over the king, and that she constantly opposed all measures of reform. The enthusiastic reception given her at the guard's ball at Versailles on Oct. 1, 1789, raised the general indignation to the highest pitch, and was followed in a few days by the insurrection of women, and the attack on Versailles. When practically prisoners in the Tuileries it was she who advised the flight of the royal family in June, 1791, which ended in their capture and return. On Aug. 10, 1792, she heard her husband's deposition pronounced by the Legislative Assembly, and accompanied him to the prison in the Temple, where she displayed the magnanimity of a heroine and the patient endurance of a martyr. In January, 1793, she parted with her husband who had been condemned by the Convention; in August she was removed to the Conciergerie; and in October she was charged before the revolutionary tribunal with having dissipated the finances, exhausted the treasury, corresponded with the foreign enemies of France, and favored the domestic foes of the country. She defended herself with firmness, decision, and indignation; and heard the sentence of death pronounced with perfect calmness—a calmness which did not forsake her when the sentence was carried out the following morning. Her son, eight years of age, died shortly afterward, as was generally believed by poison, and her daughter was suffered to quit France, and afterward married her cousin, the Duke of Angoulême.

Antonell'o (of Messina), an Italian painter who died in the end of the sixteenth century, and is said to have introduced oil-painting into Italy (at Venice), having been instructed in it by John Van Eyck.

Antoni'nus, Wall of, a barrier erected by the Romans across the isthmus between the Forth and the Clyde, in Scotland, in the reign of Antoninus Pius. Its whole length

Antoninus Pius

exceeded 27 miles. It may still be traced at various points, and is commonly known as *Graham's Dyke*.

Antoninus Pius, **TITUS AURELIUS FULVUS** (86-161 A. D.), Roman emperor. In A. D. 120 he became consul, and he was one of the four persons of consular rank among whom Hadrian divided the supreme administration of Italy. He then went as proconsul to Asia. In A. D. 138 he was selected by that emperor as his successor, and the same year he ascended the throne. The persecutions of the Christians he speedily abolished. He carried on but a few wars. In Britain he extended the Roman dominion, and by raising a new wall put a stop to the invasions of the Picts and Scots. The senate gave him the surname *Pius*, that is, dutiful or showing filial affection, because to keep alive the memory of Hadrian he had built a temple in his honor. He was succeeded by Marcus Aurelius, his adopted son.

Antony, **MARK** (Marcus Antonius) (B. C. 83-30), Roman triumvir, was connected with the family of Cæsar by his mother. Debauchery and prodigality marked his youth. To escape his creditors he went to Greece in 58, and from thence followed the consul Gabinius on a campaign in Syria as commander of the cavalry. He served in Gaul under Cæsar in 52 and 51. In 50 he returned to Rome to support the interests of Cæsar against the aristocratical party headed by Pompey, and was appointed tribune. When war broke out between Cæsar and Pompey, Antony led reinforcements to Cæsar in Greece, and in the battle of Pharsalia he commanded the left wing. He afterward returned to Rome with the appointment of master of the horse and governor of Italy (47). In B. C. 44 he became Cæsar's colleague in the consulship. Soon after, Cæsar was assassinated, and Antony would have shared the same fate had not Brutus stood up in his behalf. Antony, by the reading of Cæsar's will, and by the oration which he delivered over his body, excited the people to anger and revenge, and the murderers were obliged to flee. After several quarrels and reconciliations with Octavianus, Cæsar's heir, Antony departed to Cisalpine Gaul, which province had been conferred upon him against the will of the senate. But Cicero thundered against him in his famous Philippics; the senate declared him a public enemy, and intrusted the conduct of the war against him to Octavianus and the consuls Hirtius and Pansa. After a campaign of varied fortunes Antony fled with his troops over the Alps. Here he was joined by Lepidus, who commanded in Gaul, and through whose mediation Antony and Octavianus were again reconciled. It was agreed that the Roman world should be divided among the three conspirators, who were called triumvirs. Antony was to take Gaul; Lepidus, Spain; and Octavianus, Africa and Sicily. They decided upon the proscription of their mutual enemies, each giving up his friends to the others, the most celebrated of the victims being Cicero the orator. Antony and Octavianus departed

Antwerp

in 42 for Macedonia, where the united forces of their enemies, Brutus and Cassius, formed a powerful army, which was, however, speedily defeated at Philippi. Antony next visited Athens, and thence proceeded to Asia. In Cilicia he ordered Cleopatra, queen of Egypt, to apologize for her insolent behavior to the triumviri. She appeared in person, and her charms fettered him forever. He followed her to Alexandria, where he bestowed not even a thought upon the affairs of the world, till he was aroused by a report that hostilities had commenced in Italy between his own relatives and Octavianus. A short war followed, which was decided in favor of Octavianus before the arrival of Antony in Italy. A reconciliation was effected, which was sealed by the marriage of Antony with Octavia, the sister of Octavianus. A new division of the Roman dominions was now made (in 40), by which Antony obtained the east, and Octavianus the west. After his return to Asia, Antony gave himself up entirely to Cleopatra, assuming the style of an eastern despot, and so alienating many of his adherents and embittering public opinion against him at Rome. At length war was declared at Rome against the queen of Egypt, and Antony was deprived of his consulship and government. Each party assembled its forces, and Antony lost, in the naval battle at Actium (B. C. 31), the dominion of the world. He followed Cleopatra to Alexandria, and on the arrival of Octavianus, his fleet and cavalry deserted, and his infantry was defeated. Deceived by a false report which Cleopatra had disseminated of her death, he fell upon his own sword.

An'trim, a county of Ireland, province of Ulster, in the n.e. of the island. Area 762,080 acres, of which about a third are arable. A range of basaltic strata stretches along the northern coast, of which the celebrated Giant's Causeway is the most remarkable portion. The spinning of linen and cotton yarn, and the weaving of linen and cotton are the staple manufactures. The principal towns are Belfast, Ballymena, and Larne. Pop. 427,968.—The town of Antrim, at the north end of Lough Neagh, is a small place with a population of 2,020.

Ant'werp, the chief port of Belgium, and the capital of a province of the same name, on the Scheldt, about 50 miles from the open sea. It is strongly fortified, being completely surrounded on the land side by a semicircular inner line of fortifications, the defenses being completed by an outer line of forts and outworks. The cathedral, with a spire 400 feet high, one of the largest and most beautiful specimens of Gothic architecture in Belgium, contains Rubens's celebrated masterpieces—the *Descent from the Cross*, the *Elevation of the Cross*, and *The Assumption*. The other churches of note are St. James's, St. Andrew's, and St. Paul's, all enriched with paintings by Rubens, Vandyck, and other masters. The harbor accommodation is extensive. The shipping trade has greatly advanced in recent times, and is now very large, the goods being

Anubis

largely in transit. There are numerous and varied industries. Antwerp is mentioned as early as the eighth century. In the sixteenth century it is said to have had a population of 200,000. The wars between the Netherlands and Spain greatly injured its commerce, which was almost ruined by the closing of the navigation of the Scheldt in accordance with the peace of Westphalia (1648). It is only in the present century that its prosperity has revived. Pop. 204,498. The province consists of a fertile plain 1,100 sq. mi. in area, and has a population of 652,061.

Anu'bis, one of the deities of the ancient Egyptians, the son of Osiris by Isis. His office was to conduct the souls of the dead from this world to the next.

Anvil, an instrument on which pieces of metal are laid for the purpose of being hammered. The common smith's anvil is generally made of seven pieces; namely, the core or body; the four corners for the purpose of enlarging its base; the projecting end, which contains a square hole for the reception of a set or chisel to cut off pieces of iron; and the beak or conical end, used for turning pieces of iron into a circular form, etc. These pieces are each separately welded to the core and hammered so as to form a regular surface with the whole. When the anvil has received its due form, it is faced with steel, and is then tempered in cold water. The smith's anvil is generally placed loose upon a wooden block. The anvil for heavy operations, such as the forging of ordnance and shafting, consists of a huge iron block deeply imbedded, and resting on piles of masonry.

Aor'ta, in anatomy, the great artery or trunk of the arterial system, proceeding from the left ventricle of the heart, and giving origin to all the arteries except the pulmonary. It first rises toward the top of the breast-bone, when it is called the *ascending aorta*; then makes a great curve, called the transverse or *great arch of the aorta*, whence it gives off branches to the head and upper extremities; thence proceeding toward the lower extremities, under the name of the *descending aorta*, it gives off branches to the trunk; and finally divides into the two iliacs, which supply the pelvis and lower extremities.

Apaches (a-pä'chez), a warlike race of Indians inhabiting Arizona, New Mexico, and the northern states of Mexico. Ages ago they migrated from the



Apache.

Aphasia

vicinity of the Great Slave Lake in Canada; they have become the veritable Ishmaels of the West. For years they carried on a guerilla warfare with settlers and troops. Their leader, Geronimo, was captured by General Miles and with other hostiles, kept as prisoners of war. Civilization is slowly benefiting the Apaches on the San Carlos and White Mountain reservations in Arizona. One highly educated Apache, Antonio Apache, was one of the officials of the department of anthropology at the World's Columbian Exposition in Chicago, 1893.

Ap'atite, a translucent but seldom transparent mineral, a compound of phosphate of lime with fluoride and chloride of calcium. It occurs principally in primitive rocks and in veins, extensive deposits being found in all parts of the world. It is now largely utilized as a source of artificial phosphate manures.

Ape, a common name of a number of quadrumanous animals inhabiting the Old World (Asia and the Asiatic islands, and Africa), and including a variety of species. The word *ape* was formerly applied indiscriminately to all quadrumanous mammals; but it is now limited to the anthropoid or man-like monkeys. The family includes the chimpanzee, gorilla, orang-outang, etc. See *Anthropoid Apes*.

Apelles (a-pel'ēz), the most famous of the painters of ancient Greece and of antiquity, was born in the fourth century B. C., probably at Colophon. Ephorus of Ephesus was his first teacher, but attracted by the renown of the Sicyonian school he went and studied at Sicyon. In the time of Philip he went to Macedonia, and there a close friendship between him and Alexander the Great was established. The most admired of his pictures was that of Venus rising from the sea and wringing the water from her dripping locks. His portrait of Alexander with a thunderbolt in his hand was no less celebrated. His renown was at its height about B. C. 330, and he died about the end of the century. Among the anecdotes told of Apelles is the one which gave rise to the proverb, "Let not the shoemaker go beyond his shoe." Having heard a cobbler point out an error in the drawing of a shoe in one of his pictures he corrected it, whereupon the cobbler took upon him to criticise the leg, and received from the artist the famous reply.

Ap'ennines, a prolongation of the Alps, forming the "backbone of Italy." The average height of the mountains composing the range is about 4,000 feet, and nowhere do they reach the limits of perpetual snow, though some summits exceed 9,000 feet in height. They consist almost entirely of limestone rocks, and are exceedingly rich in the finest marbles. On the south slopes volcanic masses are not uncommon. Mount Vesuvius, the only active volcano on the continent of Europe, is an instance. The lower slopes are well clothed with vegetation, the summits are sterile and bare.

Apha'sia, in pathology, a symptom of certain morbid conditions of the nervous system, in which the patient loses the power of expressing ideas by means of words, or loses the

Aphrodite

appropriate use of words, the vocal organs the while remaining intact and the intelligence sound. There is sometimes an entire loss of words as connected with ideas, and sometimes only the loss of a few. In one form of the disease, called *aphemia*, the patient can think and write, but cannot speak; in another called *agraphia*, he can think and speak, but cannot express his ideas in writing. In a great majority of cases, where post-mortem examinations have been made, morbid changes have been found in the left frontal convolution of the brain.

Aphrodite (af-ro-dī'tē), the goddess of love among the Greeks; usually regarded as equivalent to the Roman Venus. A festival called Aphrodisia, was celebrated to her in various parts of Greece, but especially in Cyprus.

Aphthæ (af'thē), a disease occurring especially in infants, but occasionally seen in old persons, and consisting of small, white ulcers upon the tongue, gums, inside of the lips, and palate, resembling particles of curdled milk; commonly called *thrush* or *milk thrush*.

A'pia, the chief place and trading center of the Samoan Islands, on the north side of the island of Upolu. It was the scene of a terrible disaster to the American and German navies during a hurricane.

A piary, a place for keeping bees. The apiary should be well sheltered from strong winds, moisture, and the extremes of heat and cold. The hives should face the south or southeast, and should be placed on shelves two feet above the ground, and about the same distance from each other. As to the form of the hives, and materials of which they should be constructed, there are great differences of opinion. Wooden hives of square, box-like form are now gaining general favor among bee keepers. They usually consist of a large breeding chamber below, and two sliding removable boxes called supers above, for the abstraction of honey without disturbing the contents of the main chamber. It is of great importance that the apiary should be situated in the neighborhood of good feeding grounds, such as gardens, clover fields, or heath-covered hills. When their stores of honey are removed the bees must be fed during the winter and part of spring with syrup or with a solution consisting of 2 lbs. loaf sugar to a pint of water. In the early spring slow and continuous feeding (a few ounces of syrup each day) will stimulate the queen to deposit her eggs, by which means the colony is rapidly strengthened and throws off early swarms. New swarms may make their appearance as early as May and as late as August, but swarming usually takes place in the intervening months.

Apic'ius, MARCUS GABIUS, a Roman epicure in the time of Augustus and Tiberius, who, having exhausted his vast fortune on the gratification of his palate, and having *only* about \$400,000 left, poisoned himself that he might escape the misery of plain diet. The book of cookery published under the name of Apicius was written by one Cælius, and belongs to a much later date.

Apollonius

A'pis, a bull to which divine honors were paid by the ancient Egyptians, who regarded him as a symbol of Osiris. He was not suffered to live beyond twenty-five years, being secretly killed by the priests and thrown into a sacred well. Another bull was selected in his place. His birthday was annually celebrated, and his death was a season of public mourning.

Apoc'alyse, the name frequently given to the last book of the New Testament, in the English version called the Revelation of St. John the Divine. It is generally believed that the Apocalypse was written by the apostle John in his old age (95-97 A. D.) in the Isle of Patmos, whither he had been banished by the Roman emperor Domitian.

Apoc'rypha (Greek, "things concealed or spurious"), a term applied in the earliest churches to various sacred or professedly inspired writings, sometimes given to those whose authors were unknown, sometimes to those with a hidden meaning, and sometimes to those considered objectionable. The term is specially applied to the fourteen undermentioned books which were written during the two centuries preceding the birth of Christ: The first and second books of Esdras, Tobit, Judith, the rest of the book of Esther, the Wisdom of Solomon, the Wisdom of Jesus the son of Sirach, or Ecclesiasticus, Baruch the Prophet, the Song of the Three Children, Susanna and the Elders, Bel and the Dragon, the Prayer of Manasses, and the first and second Books of Maccabees.

Apollina'ris Water, a natural aerated water, belonging to the class of acidulated soda waters, and derived from the Apollinaris-brunnen, a spring in the valley of the Ahr, near the Rhine, in Rhenish Prussia, forming a highly esteemed beverage.

Apol'lo, son of Zeus (Jupiter) and Leto, the twin brother of Diana. He slew the serpent Python on the fifth day after his birth; afterward, with his sister Artemis, he killed the children of Niobe. He destroyed the Cyclops, because they forged the thunderbolts with which Zeus killed his son Æsculapius. Apollo was originally the sun god. In later times the view was almost universal that Apollo and Helios were identical. From being the god of light and purity in physical sense, he gradually became the god of moral and spiritual light and purity, and political progress. He came to be regarded as the god of song and prophecy, the institutor and guardian of civil and political order, and the founder of cities. His worship was introduced at Rome, probably in the time of the Tarquins. Among the ancient statues of Apollo that have come down to us, the most remarkable is the one called the *Apollo Belvedere*, from the Belvedere Gallery in the Vatican at Rome.

Apollo'nus of TYRE, the hero of a tale which had an immense popularity in the Middle Ages and which furnished the plot of Shakespeare's *Pericles, Prince of Tyre*. The story, originally in Greek, first appeared in the third century after Christ.

Apoplexy

Ap'oplexy, abolition or sudden diminution of sensation and voluntary motion, from suspension of the functions of the cerebrum, resulting from congestion or rupture of the blood-vessels of the brain and the resulting pressure on this organ. In a complete apoplexy the person falls suddenly, is unable to move his limbs or to speak, gives no proof of seeing, hearing, or feeling, and the breathing is stertorous or snoring, like that of a person in deep sleep. The premonitory symptoms of this dangerous disease are drowsiness, giddiness, dulness of hearing, frequent yawning, disordered vision, noise in the ears, vertigo, etc. It is most frequent between the ages of fifty and seventy. A large head, short neck, full chest, sanguine and plethoric constitution, and corpulency are generally considered signs of predisposition to it; but the state of the heart's action, with a plethoric condition of the vascular system, has a more marked influence. Out of 63 cases carefully investigated only 10 were fat and plethoric, 23 being thin, and the rest of ordinary habit. Among the common predisposing causes are long and intense thought, continued anxiety, habitual indulgence of the temper and passions, sedentary and luxurious living, sexual indulgence, intoxication, etc. More or less complete recovery from a first and second attack is common, but a third is almost invariably fatal.

Apos'tles (literally, persons sent out), the twelve men whom Jesus selected to attend him during his ministry and to promulgate his religion. Their names were as follows: Simon Peter, and Andrew his brother; James, and John his brother, sons of Zebedee; Philip; Bartholomew; Thomas; Matthew; James, the son of Alphaeus; Lebbeus, his brother, called *Judas*; Simon, the Canaanite; and Judas Iscariot. To these were subsequently added Matthias (chosen by lot in place of Judas Iscariot) and Paul. The Bible gives the name of apostle to Barnabas also, who accompanied Paul on his missions (Acts 14:14). In a wider sense those preachers who first taught Christianity in heathen countries are sometimes termed apostles; for example, St. Denis, the apostle of the Gauls; St. Boniface, the apostle of Germany; St. Augustine, the apostle of England; Francis Xavier, the apostle of the Indies; Adalbert of Prague, the apostle of Prussia proper. Their subsequent history is only imperfectly known.

Apostles' Creed, a well-known formula or declaration of Christian belief, formerly believed to be the work of the apostles themselves, but it can only be traced to the fourth century.

Apothecaries' weight, the weight used in dispensing drugs, in which the pound (lb.) is divided into 12 ounces, the ounce into 8 drams, the dram into 3 scruples, and the scruple into 20 grains, the grain being equivalent to that in avoirdupois weight.

Apoth'ecary, in a general sense, one who keeps a shop or laboratory for preparing, compounding, and vending medicines, and for the

Appalachian

making up of medical prescriptions. It is well known that the word "apotheca" signified any kind of store, magazine, or warehouse, and that the proprietor or keeper of such a store was called apothecarius. The physicians in Africa first began to give up the preparation of medicines after prescriptions to ingenious men. It is probable, therefore, that many Arabic terms of art were by these means introduced into pharmacy and chemistry, and have been still retained and adopted. In England the term was long applied (and to some little extent still) to a regularly licensed class of medical practitioners, being such persons as were members of, or licensed by, the Apothecaries' Company in London. The apothecaries of London were at one time ranked with the grocers, with whom they were incorporated by James I in 1606. In 1617, however, the apothecaries received a new charter as a distinct company. In the U. S. the several states have laws controlling apothecaries.

Apotheo'sis (deification), a solemnity among the ancients by which a mortal was raised to the rank of the gods. The custom of placing mortals who had rendered their countrymen important services, among the gods, was very ancient among the Greeks. The Romans, for several centuries, deified none but Romulus, and first imitated the Greeks in the fashion of frequent apotheosis after the time of Caesar. From this period apotheosis was regulated by the decrees of the senate, and accompanied with great solemnities. The greater part of the Roman emperors were deified.

Appalachian Mountains (ap-pa-la'chi-an), also called Alleghanies, a vast mountain range in N. America extending for 1,300 mi. from Cape Gaspé, on the Gulf of St. Lawrence, s.w. to Alabama. The system has been divided into three great sections: the *northern* (including the Adirondacks, the Green Mountains, the White Mountains, etc.), from Cape Gaspé to New York; the *central* (including a large portion of the Blue Ridge, the Alleghanies proper, and numerous lesser ranges), from New York to the valley of the New River; and the *southern* (including the continuation of the Blue Ridge, the Black Mountains, the Smoky Mountains, etc., from the New River southward. The chain consists of several ranges generally parallel to each other, the altitude of the individual mountains increasing on approaching the south. The highest peaks rise over 6,600 feet (not one at all approaching the snow-level), but the mean height is about 2,500 feet. Lake Champlain is the only lake of great importance in the system, but numerous rivers of considerable size take their rise here. Magnetite, hematite, and other iron ores occur in great abundance and the coal-measures are among the most extensive in the world. Gold, silver, lead, and copper are also found, but not in paying quantities, while marble, limestone, fire-clay, gypsum, and salt abound. The forests covering many of the ranges yield large quantities of valuable timber, such as

Appalachicola

sugar-maple, white birch, beech, ash, oak, cherry-tree, white poplar, white and yellow pine.

Appalachicola (chi-co'la), a river of the U. S. formed by the Chattahoochee and Flint Rivers, which unite near the northern border of Florida; length about 100 mi.; flows into the Gulf of Mexico and is navigable.

Apparent, in astronomy. When it is necessary or convenient to reduce an observed phenomenon, either by clearing it from the effects of any optical delusion, or substituting for it the phenomenon which would have been observed at some more commodious station, that which is actually observed is called the *apparent* phenomenon, in opposition to that which results from correction or reduction.

Appeal, in law, is the removal of a suit from an inferior to a superior court that the latter may affirm, reverse, or alter the judgment of the former.

Appendicitis is an inflammation of the vermiform appendix. Formerly the disease was not known under the above name, but was thought to be an inflammation of that portion of the intestine called the cæcum, along with inflammatory processes of the peritoneum covering the cæcum. The work of American physicians and surgeons, such as Pepper, McBurney, Senn, Weaver, Keen and others, has put this disease on a rational and scientific basis, so that now it is under perfect control.

The vermiform appendix is a functionless organ, and is, doubtless, a relic of a large ancestral cæcum. It is usually about three inches long, but may, however, be much shorter or much longer. Its ordinary diameter is about $\frac{1}{4}$ in. but this may be much increased by distension. It may occupy almost any position in the abdominal cavity and may be adherent to almost any organ in said cavity. In about 60 per cent. of cases, however, it occupies one of two positions, i.e. in first case it takes an upward and inward direction with the tip pointing toward the spleen; in second case it lies directly behind the cæcum. Both these positions favor the complete emptying of the cavity of any matter which might have become lodged in it. It may be located usually by taking the mid-point on a line drawn from the anterior superior spine of the ilium (the prominent anterior projection of the hip-bone) to the umbilicus (navel). In 95 per cent. or more of cases it is located in the right iliac fossa, but, rarely, it may extend across the pelvic cavity, and appear in the left iliac fossa. The name given to the mid-point on above line locating the appendix is McBurney's point. An anatomical item of great importance to be considered is that the position of the appendix may vary within broad limits.

CAUSES.—These may be divided into two general classes:

1. *Predisposing.*
2. *Exciting.*

Under predisposing causes we have:

a. *Anatomical and embryological relations.* Its anatomical location at the end of the cæcum forming a cul-de-sac permits of thicken-

Appendicitis

ing and concretion. Structures which remain as functionless vestiges of parts once useful have a low vitality and feeble powers of resistance against invasion by disease processes.

b. *Age.* The two extremes of life are notably exempt. More than 50 per cent. of the cases appear between ages of 20 and 50. The reasons for above are purely theoretical, but probably have to do with position and shape of the appendix in the young, while in the old the atrophy attendant on all organs probably plays a role.

c. *Sex.* A great disproportion exists between the occurrence of the disease in the sexes. The male suffers with appendicitis four or five times as frequently as the female. This has been explained by purely anatomical reasons, namely: a fold of peritoneum (the appendiculovarian ligament) passes from the right ovary to the meso-appendix and carries a blood-vessel which enables the female appendix to withstand invasion by disease owing to greater nutrition and greater physiological powers. Again, the male appendix is longer and slightly larger in diameter, hence it may be subject to invasion by concretions in more cases.

d. *Occupation.* Persons whose work necessitates much heavy lifting seem more prone to the disease.

e. *Previous gastro-intestinal disturbances.*

EXCITING CAUSES:

a. *Mechanical.*

1. Distension of the cæcum with gas & fecal matter followed by obliteration of the cavity of the appendix resulting in congestion, swelling and inflammation.

2. Foreign bodies. These were once thought to be the chief causes of appendicitis, but it is shown from statistics, that they are rarely (4 or 5 per cent. only) the direct causative factor. By foreign bodies we mean stones and seeds of various fruits, bits of bone, pins, etc.

3. Wounds. These are of two kinds—direct and indirect. The former may, properly, come under head of foreign bodies, as, for instance that of a pin in the cavity of the appendix causing an injury to the mucous membrane lining the cavity. The latter is, of course, due to injury directed through the abdominal wall, as, for instance, that following the kick of a horse, causing violent symptoms.

b. *Bacterial.* Micro-organisms are, doubtless, prime factors in the causation of appendicitis. They may act independently, but usually the invasion is preceded by a twist, constriction, the presence of a foreign body, or something which will bring about a condition of lessened physiological resistance. In this condition the bacillus coli communis, a normal inhabitant of the intestine, exerts its peculiar powers. This microbe seems to have little or no effect on the sound mucous membrane, but under above circumstances it shows marked disease and pus-producing properties.

Other micro-organisms, such as those of typhoid fever (bacillus typhosis), tuberculosis (bacillus tuberculosis), cholera (spirillum cholerae), etc., may cause the disease, but about

Appendicitis

80 per cent. of cases are associated with the bacillus coli communis.

DISEASE PROCESSES (PATHOLOGY).—These processes are of course manifold and cannot be discussed here. A brief outline of the changes taking place is as follows:

The primary location of the trouble is in the epithelial coat of the appendix. Owing to constriction, distension or what not, the physiological resistance of the appendix is impaired. Congestion and swelling follow. Obliteration of cavity and thickening of the walls may take place, but in severer cases, necrosis (death of the tissue) and ulceration occur rapidly. This ulcerative process goes on until perforation of the appendicular wall takes place. Following close upon this we have local or general peritonitis (inflammation of peritoneum lining abdominal cavity) according as we have formation of adhesions between loops of mesentery.

Symptoms. Usually we have several cardinal symptoms, all of which are present to a more or less degree.

a. Sudden pain in abdomen. This pain is variable, at times being sharp, intense and colic-like, at others a dull ache. It is at first general and diffused over the abdomen. Later it gradually narrows down, and usually within thirty-six hours is localized in the right iliac fossa in the region of McBurney's point.

b. Fever. This follows rapidly upon the pain, and is so regular that a negative diagnosis is sometimes possible where intense pain with no fever exists. The fever may be moderate, (100–102°) often going to 103°. It must, of course, be remembered here that the pulse is quickened in proportion to the fever (90–110.)

c. Gastro-intestinal disturbances. Tongue furred and moist. Nausea and vomiting usually present. Constipation usual, but diarrhoea may occur.

d. Local signs. At first no distension of abdomen takes place. On palpation (manual examination) two important signs are noticed, usually from outset—at any event, within twenty-four hours.

1. Great tension of right rectus muscle which is found in iliac fossa.

2. Tenderness or actual pain on pressure over McBurney's point.

Often along with these signs are noticed a distinct swelling, commonly circumscribed and definite.

e. General signs and symptoms:

Position of patient. Patient lies on back, right leg semiflexed in order to reduce tension and consequent pressure; bladder irritable, urine scanty and contains albumin and indican (a chemical compound indicative of fermentative processes in the intestine).

DIAGNOSIS.

In brief, we may say that we have an indication of appendicitis when we have the following complex of symptoms:

1. Localized pain in right iliac fossa, with or without swelling.

2. Tenderness over McBurney's point.

3. Fever.

Appendicitis

4. Gastro-intestinal disturbances.

However, we must bear in mind that many diseases must be differentiated from appendicitis. Chief among them are biliary colic, renal colic, ovarian tumors, pelvic peritonitis, intussusception (slipping of one part of intestine into another), strangulation, pancreatitis, typhoid fever, and many others.

Prognosis.

A large proportion of all cases recover. The element of uncertainty, however, plays such a role that the surgical treatment of this disease has been given a great impetus.

Usually in a case undergoing recovery the pain lessens in three or four days, temperature falls, vomiting ceases, and acute symptoms subside within a week or ten days.

As a result of perforation of the appendix we may have local abscess formation and later general peritonitis. Usually the death in appendicitis is a result of peritonitis. In this last disease lies the gravity of appendicitis. The onset is usually sudden and soon the characteristic symptoms appear. If the general peritoneal cavity is invaded death is almost certain to follow unless prompt surgical measures are taken.

The prognosis in certain cases is very different. A certain number of cases apparently recover, and within a few months the same complex of symptoms appears again. This is the relapsing or recurring form of appendicitis and may recur several times. Surgical treatment is the only resource.

TREATMENT.—The question of treatment of appendicitis is, of course, open to discussion. Two views are held according as the attendant is a physician or a surgeon.

In general it may be said that there is no medicinal treatment for appendicitis. There are remedies allaying pain, but none capable of controlling and limiting the course of the disease. General measures should be adopted, such as rest in bed, light diet, etc. The question of giving an astringent or a purgative is an open one. The general rule is to administer saline cathartics in the incipient stage and follow this by opium, in some form or other, as soon as the bowels have moved freely. The opium relieves pain and secures rest for the inflamed part by preventing peristalsis (creeping motion peculiar to bowels) and thus lessening the liability to perforation. Cathartics are contraindicated except during incipient stage. Even in incipient stages one must take care in the administration of cathartics, as they stimulate peristalsis and increase liability to perforation. They are also contraindicated in local abscess formation. If the disease does not yield to the ordinary methods of careful nursing and rest, surgical treatment is indicated when by the third day the case shows signs of progressive lesion (structural change of tissue due to injury or disease). The technique of the operation is of no consequence here. The point is that an operation is usually advisable when progression is noticed in the disease. The earlier the operation the better for the patient, as the chances

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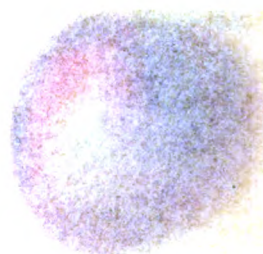
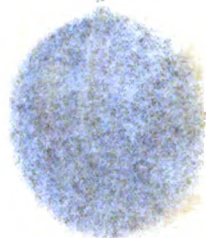
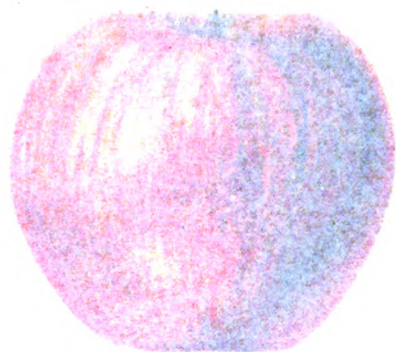
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Appenzell

of recovery are greatly lessened by the appearance of peritonitis.

We must hence regard appendicitis as a disease of the appendix, characterized by local pain, tenderness, fever, gastro-intestinal disturbances, etc., and treated most successfully by surgical methods.

R. W. WEBSTER, M. D., PH. D.

Appenzell (ăp'pen-tsel), a Swiss canton. Area 162 sq. mi. It is divided into two independent portions or half-cantons, Ausser-Rhoden, which is Protestant, and Inner-Rhoden, which is Catholic. Glaciers occupy the higher valleys. Flax, hemp, grain, fruit, etc., are produced, but the wealth of Inner-Rhoden lies in its herds and flocks; that of Outer-Rhoden in its manufactures of embroidered muslins, gauzes, cambrics, and other cotton stuffs; also of silk goods and paper. The town of Appenzell (German *Abtenzel*, abbot's cell) is the capital of Inner-Rhoden, on the Sitter, with about 4,300 inhabitants. Trogen is the capital of Outer-Rhoden, Herisau the largest town (pop. 11,000). Pop. of Outer-Rhoden, 51,960; Inner-Rhoden, 12,882.

Ap'petite, in its widest sense, means the natural desire for gratification, either of the body or the mind; but is generally applied to the recurrent and intermittent desire for food. A healthy appetite is favored by work, exercise, plain living, and cheerfulness; absence of this feeling, or defective appetite, indicates diseased action of the stomach, or of the nervous system or circulation, or it may result from vicious habits. Depraved appetite, or a desire for unnatural food, as chalk, ashes, dirt, soap, etc., depends often in the case of children on vicious tastes or habits; in grown up persons it may be symptomatic of dyspepsia, pregnancy, or chlorosis. Insatiable or canine appetite or voracity, when it occurs in childhood, is generally symptomatic of worms; in adults common causes are pregnancy, vicious habits, and indigestion, caused by stomach complaints or gluttony, when the gnawing pains of disease are mistaken for hunger.

Appia'ni, ANDREA, a painter (1754-1817), a painter born at Milan. As a fresco-painter he excelled every contemporary painter in Italy.

Appian Way, called *Regina Viarum*, the Queen of Roads; the oldest and most renowned Roman road, was constructed during the censorship of Appius Claudius Cæcus (B. C. 313-310). It was built with large square stones on a raised platform, and was made direct from the gates of Rome to Capua, in Campania. It was afterward extended through Samnium and Apulia to Brundisium, the modern Brindisi. It was partially restored by Pius VI, and in 1850-53 it was excavated by order of Pius IX, as far as the eleventh milestone from Rome.

Appius Claudius Crassus, one of the Roman decemvirs, appointed B. C. 451 to draw up a new code of laws. He and his colleagues plotted to retain their power permanently, and at the expiry of their year of office refused to give up their authority. The people were incensed

Apple

against them, and the following circumstances led to their overthrow: Appius Claudius had conceived an evil passion for Virginia, the daughter of Lucius Virginius, then absent with the army in the war with the Æqui and Sabines. At the instigation of Appius, Marcus Claudius, one of his clients, claimed Virginia as the daughter of one of his own female slaves, and the decemvir, acting as judge, decided that in the meantime she should remain in the custody of the claimant. Virginius, hastily summoned from the army, appeared with his daughter next day in the forum, and appealed to the people; but Appius Claudius again adjudged her to M. Claudius. Unable to rescue his daughter, the unhappy father stabbed her to the heart. The decemvirs were deposed by the indignant people B. C. 449, and Appius Claudius died in prison or was strangled.

Apple, the fruit of a well-known tree, or the tree itself. The apple belongs to the temperate regions of the globe, over which it is almost universally spread and cultivated. The tree attains a moderate height, with spreading branches; the leaf is ovate; and the flowers are produced from the wood of the former year, but more generally from very short shoots or spurs from wood of two years' growth. The original of all the varieties of the cultivated apple is the wild crab, which has a small and extremely sour fruit, and is a native of most of the countries of Europe. The apple was probably introduced into Britain by the Romans. To the facility of multiplying varieties by grafting is to be ascribed the amazing extension of the sorts of apples. The latest development is the production of seedless apples. Credit for this propagation is given to John F. Spencer of Grand Junction, Colorado. After several years' persistent experimentation he produced at last five trees that bore seedless, coreless and wormless apples. The fruit has a beautiful dark red color with yellow strawberry dots and is of a goodly size and has a flavor not unlike the wine-sap. The meat of the new apple is solid and has a slight hardened substance near the blossom end, quite similar to the navel in the orange. This is expected to decrease in size by cultivation, as the navel has done. The tree is quite as hardy as the usual variety and has a smooth bark. One of the special features that go with this seedless variety is the blossomless tree. There is a stamen and a very small quantity of pollen, just as are found on the ordinary apple tree, but the flower is entirely missing. This lack of a flower leaves no place for the codling moth to deposit its eggs, so that it means the production of wormless apples. Also the absence of the blossom makes the apple tree practically immune to the late frosts that often play such havoc with the crops of the flowering kinds. Many of the more marked varieties of apples containing seeds are known by general names, as pippins, codlins, renetts, etc. Apples for the table are characterized by a firm, juicy pulp, a sweetish acid flavor, regu-

Apple of Discord

lar form, and beautiful coloring; those for cooking, by the property of forming, by the aid of heat, into a pulpy mass of equal consistency, as also by their large size and keeping properties; apples for cider must have a considerable degree of astringency, with richness of juice. The propagation of apple-trees is accomplished by seeds, cuttings, suckers, layers, budding, or grafting, the last being almost the universal practice. The tree thrives best in a rich, deep loam or marshy clay, but will thrive in any soil provided it is not too wet or too dry. The wood of the apple-tree or the common crab is hard, close-grained, and often richly colored, and is suitable for turning and cabinet work. The fermented juice of the crab is employed in cookery and medicine. Cider, the fermented juice of the apple, is a favorite drink in many portions of the U. S. The designation apple, with various modifying words, is applied to a number of fruits having nothing in common with the apple proper, as alligator-apple, love-apple. See colored plate, Fruits.

Apple of Discord, according to the story in the Greek mythology, the golden apple thrown into an assembly of the gods by the goddess of discord (Eris) bearing the inscription "for the fairest." Aphrodite (Venus), Hera (Juno), and Pallas (Minerva), became competitors for it, and its adjudication to the first by Paris so inflamed the jealousy and hatred of Hera to all of the Trojan race (to which Paris belonged) that she did not cease her machinations till Troy was destroyed.

Appleton, county seat of Outagamie county, Wis., on the grand chute of the Fox River, 100 miles northwest of Milwaukee. Railroads: C. & N. W., C. M. & St. P. Industries: paper and pulp mills, flour mills, woolen factories, lumber mills, iron foundries, machine shops, knitting works and bicycle works. Appleton is the seat of Lawrence University, founded in 1849. The surrounding country is agricultural. The town was settled in 1840 and became a city in 1857. Population 1900, 15,085.

Appleton, CHARLES EDWARD (1841-1879), was born at Reading, and was educated at Oxford and in Germany. His reading was wide and varied, but he wrote little. He founded in 1869 the *Academy*, whose special feature is its signed articles. He died at Luxor, in Upper Egypt.

Appleton, DANIEL (1785-1849), the founder of the American publishing house of D. Appleton & Co., was born at Haverhill, Mass., where he commenced business as a retail trader. He settled as a bookseller in New York, and gradually built up one of the largest businesses of its kind in the U. S. He retired in 1848, leaving the business to four sons and their descendants. The firm published, 1857, the *New American Cyclopædia*, under the editorship of George Ripley and Charles A. Dana, which was completed in 1863. A new edition was published in 1872-76. The same firm has issued many scientific and educational works.

Apsis

Appomattox Court-House, a village in Virginia, 20 mi. e. of Lynchburg. Here on April 9, 1865, General Lee surrendered to General Grant, and thus virtually concluded the Civil war.

Appropriation.—In the U. S. no money can be drawn from the Treasury but in consequence of appropriations made by law (Constitution, Art. I). Under this clause it is necessary for Congress to appropriate money for the support of the Federal government, and in payment of claims against it. In the House of Representatives appropriation bills have precedence.

Ap'ricot, a fruit of the plum genus which was introduced into Europe from Asia more than three centuries before Christ, and into England in the first half of the sixteenth century. It is a native of Armenia and other parts of Asia and also of Africa. The apricot is a low tree, of rather crooked growth, with somewhat heart-shaped leaves and sessile flowers. The fruit is sweet, more or less juicy, of a yellowish color, about the size of the peach, and resembling it in delicacy of flavor. The wood is coarsely grained and soft. Apricot-trees are chiefly raised against walls, and are propagated by budding and grafting.

A'pril ("to open," because the buds open at this time), the fourth month of the year. The strange custom of making fools on the 1st of April by sending people upon errands and expeditions which end in disappointment, and raise a laugh at the expense of the person sent, prevails throughout America. It has been connected with the miracle plays of the Middle Ages, in which the Saviour was represented as having been sent at this period of the year, from Annas to Caiaphas and from Pilate to Herod. In France the party fooled is called an April fish.

Apse, a portion of any building forming a termination or projection semicircular or polygonal in plan, and having a roof forming externally a semi-dome or semi-cone, or having ridges corresponding to the angles of the polygon; especially such a semi-circular or polygonal recess projecting from the east end of the choir or chancel of a church, in which the altar is placed. The apse was developed from the somewhat similar part of the Roman basilicæ, in which the magistrate sat.

Apsis (pl. Ap'sides or Apsi'des), in astronomy one of the two points of the orbit of a heavenly body situated at the extremities of the major axis of the ellipse formed by the orbit, one of the points being that at which the body is at its greatest, and the other that at which it is at its least, distance from its primary. In regard to the earth and the other planets, these two points correspond to the aphelion and perihelion; and in regard to the moon they correspond to the apogee and perigee. The line of the apsides has a slow, forward, angular motion in the plane of the planet's orbit, being retrograde only in Venus. This in the earth's orbit produces the anomalous year.

Apteryx

Ap'teryx, a nearly extinct genus of running birds, distinguished from the ostriches by having three toes with a rudimentary hallux, which forms a spur. They are natives of the south island of New Zealand; are totally wingless and tailless, with feathers resembling hairs, about the size of a small goose, with long, curved beaks something like that of a curlew. They are entirely nocturnal, feeding on insects, worms, and seeds. *Kiwi-kiwi*, from its cry, is the best known species.



Apteryx.

Apu'lia, a department or division in the southeast of Italy, on the Adriatic, composed of the provinces of Foggia, Bari, and Lecce. Area 8,539 sq. mi.; pop. 1,587,713.

Aq'uamarine, a name given to some of the finest varieties of beryl of a sea green or blue color. Varieties of topaz are also so called.

Aqua'rium, a vessel or series of vessels constructed wholly or partly of glass and containing salt or fresh water in which are kept living specimens of marine or fresh-water animals along with aquatic plants. In principle the aquarium depends on the interdependence of animal and vegetable life; animals consuming oxygen and exhaling carbonic acid, plants reversing the process by absorbing carbonic acid and giving out oxygen. The aquarium must consequently be stocked both with plants and animals, and for the welfare of both something like a proper proportion should exist between them. -The simplest form of aquarium is that of a glass vase; but aquariums on a larger scale consist of a tank or a number of tanks with plate-glass sides and stone floors, and contain sand and gravel, rocks, seaweeds, etc. By improved arrangements, light is admitted from above, passing through the water in the tanks and illuminating their contents, while the spectator is in comparative darkness. Aquariums on a large scale have been constructed in connection with public parks or gardens, and the name is also given to places of public entertainment in which large aquariums are exhibited. The largest aquarium in the world is at Castle Garden, N. Y. There are large aquaria at Brighton, Hamburg, and Paris. The Brighton Aquarium, which takes the lead, has forty-one tanks, containing all varieties of fish, from the stickleback to the sturgeon. Its area is 715 ft. in length by 100 ft. in breadth. There is one tank which contains 110,000 gallons of water, and has a plate-glass front, through which the habits of very large fish may be studied. The Hamburg Aquarium is nearly the same size as that at Brighton.

Aqueduct

The Paris Aquarium, belonging to the French Acclimatization Society, is 50 yards in length by about 12 in breadth, and contains 40 tanks. Castle Garden, N. Y., has been transformed into an aquarium, and has 150 tanks for smaller fish, while there are gigantic tanks for sharks and other large and dangerous fish. There are fish in the Royal Aquarium at St. Petersburg that are known by record to have been there 140 years. Some of these fish have grown to be five times as large as when they were placed there, while others have not grown at all.

Aquarius, the water-bearer; a sign in the zodiac which the sun enters about January 21; so called from the rains which prevail at that season in Italy and the East.

Aquatint, a method of etching on copper by which a beautiful effect is produced, resembling a fine drawing in sepia or Indian ink. The special character of the effect is the result of sprinkling finely powdered resin or mastic over the plate, and causing this to adhere by heat, the design being previously etched or being now traced out. The nitric acid acts only in the interstices between the particles of resin or mastic, thus giving a slightly granular appearance.

Aq'ueduct, an artificial channel or conduit for the conveyance of water from one place to another; more particularly applied to structures for conveying water from distant sources for the supply of large cities. Aqueducts were extensively used by the Romans, and many of them still remain in different places on the continent of Europe, some being still in use. The Pont du Gard in the south of France, 14 mi. from Nismes, is still nearly perfect, and is a grand monument of the Roman occupation of that country. The ancient aqueducts were constructed of stone, or brick, sometimes tunneled through hills, and carried over valleys and rivers on arches. The Pont du Gard is built of great blocks of stone; its height is 160 ft.; length of the highest arcade, 882 ft. The aqueduct at Segovia, originally built by the Romans, has in some parts two tiers of arcades 100 ft. high, is 2,921 ft. in length, and is one of the most admired works of antiquity. One of the most remarkable aqueducts of modern times is that constructed by Louis XIV for conveying the waters of the Eure to Versailles. The extensive application of metal pipes has rendered the construction of aqueducts of the old type unnecessary; but what may be called aqueduct bridges are still frequently constructed in connection with water works for the supply of towns, and where canals exist, canal aqueducts are common, since the water in a canal must be kept on a perfect level. In the U. S. there are some important aqueducts, as the Croton, about 40½ mi. long, bringing water to New York. The water is carried through 16 tunnels, the total length of which is 6,841 ft., cut through the gneiss rock. The open cutting is for the most part rock work. From the dam to Harlem River the aqueduct is of stone, brick, and cement, and has a capacity of 115 million gallons daily. The rate of flow is

Aquila

1½ miles per hour. There are two cast iron pipes two feet in diameter across the Harlem River, and over these one wrought iron pipe 7½ ft. in diameter. What is called the high bridge, which is over 1,450 ft. long, with eight arches in the river and seven on the banks, supports the pipe. The two receiving reservoirs in Central Park cover 135 acres and have a capacity of 1,180,000,000 gallons. From these reservoirs the water is conveyed by two lines of pipe 30 inches in diameter, two of 36 inches, and one of 48 inches to the distributing reservoir.

The aqueduct or flume which conveys the water from the mountains to the reservoir at San Diego, Cal., is 35 mi. long and built almost wholly of redwood. It crosses 315 streams and cañons on trestles, the longest of which is 1,700 ft. and 85 ft. high. The timbers used in these trestles were put together on the ground and raised to their position by horse power. This aqueduct passes also through eight tunnels, the longest being 2,100 ft.

Aquila (āk' wē-lā), a town in Italy, capital of the province of Aquila, 55 mi. n.e. of Rome. In 1703 and 1706 it suffered severely from earthquakes. Pop. 14,720. The province has an area of 2,509 sq. mi.; a pop. of 371,332.

Aquinas (a-kwī' nas), St. THOMAS (1227-1274), a celebrated scholastic divine. He died on his way to Lyons to attend a general council for the purpose of uniting the Greek and Latin Churches. He was called, after the fashion of the times, the *angelic doctor*, and was canonized. The most important of his numerous works, which were all written in Latin, is the *Summa Theologie*.

Aquita' nia (later, Aquitaine), a Roman province in Gaul, which comprised the countries on the coast from the Garonne to the Pyrenees, and from the sea to Toulouse. It was brought into connection with England by the marriage of Henry II with Eleanor, daughter of the last Duke of Aquitaine. The title to the province was for long disputed by England and France, but it was finally secured by the latter (1453).

Arabesque (ar' a-besk), a species of ornamentation for enriching flat surfaces, often consisting of fanciful figures, human or animal,



Arabesque.

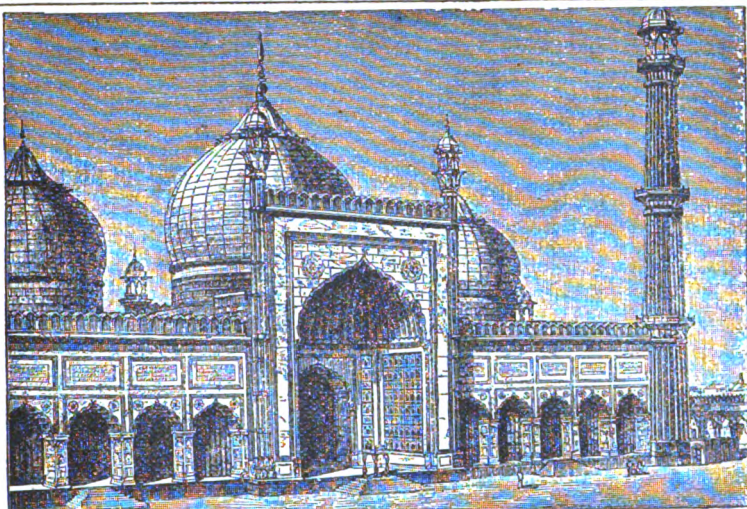
combined with floral forms. There may be said to be three periods and distinctive varieties of arabesque: (a) the Roman or Græco-Roman, introduced into Rome from the East when pure art was declining; (b) the Arabesque of the Moors as seen in the Alhambra, introduced by them into Europe in the Middle Ages;

Arabia

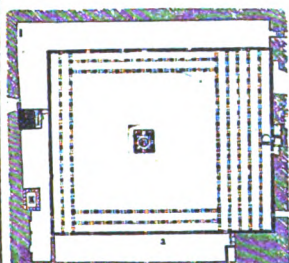
(c) Modern Arabesque, which took its rise in Italy in the Renaissance period of art. The arabesques of the Moors, who are prohibited by their religion from representing animal forms, consist essentially of complicated ornamental designs based on the suggestion of plant-growth, combined with extremely complex geometrical forms.

Ara' bi Pasha, Egyptian soldier and revolutionary leader, b. 1837. In September, 1881, he headed a military revolt, and was for a time virtually dictator of Egypt. Britain interfered, and after a short campaign, beginning with the bombardment of Alexandria and ending with the defeat of Arabi and his army at Tel-el-Kebir, he surrendered, and was banished to Ceylon.

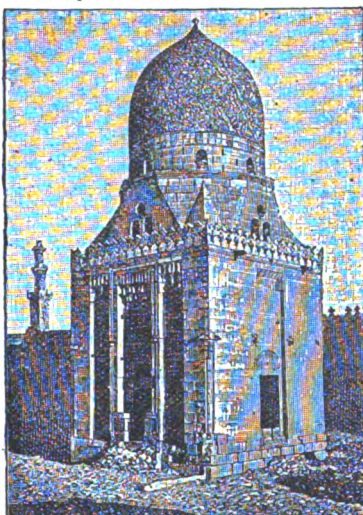
Ara' bia, a vast peninsula in the s.w. of Asia, area rather over 1,000,000 sq. mi., its pop. probably not more than 5,000,000. Roughly described, it exhibits a central table-land surrounded by a series of deserts, with numerous scattered oases, while around this is a line of mountains parallel to and approaching the coasts, and with a narrow rim of low grounds between them and the sea. In its general features Arabia resembles the Sahara, of which it may be considered a continuation. Like the Sahara it has its wastes of loose sand, its mountains devoid of vegetation, its oases with their wells and streams, their palm-groves and cultivated fields. By the ancients the whole peninsula was broadly divided into three great sections: Arabia Petrea (containing the city Petra), Deserta (desert), and Felix (happy). The first and last of these answer roughly to the modern divisions of the region of Sinai in the n.w. and Yemen in the s.w., while the name Deserta was vaguely given to the rest of the country. The principal divisions at the present are Madian in the n.w.; south of this, Hejaz, Assir, and Yemen, all on the Red Sea, the last named occupying the southwestern part of the peninsula, and comprising a maritime lowland on the shores of the Red Sea, with an elevated inland district of considerable breadth; Hadramaut, on the south coast; Oman occupying the southeast angle; El-Hasa and Koveit on the Persian Gulf; El-Hamad (Desert of Syria), Nefūd, and Jebel Shammar in the north; Nejd, the Central Highlands, which occupies a great part of the interior of the country, while south of it is the great unexplored Dahkna or sandy desert. Madian belongs to Egypt, the Hejaz, Yemen, Bahr-el-Hasa, Koveit, etc., are more or less under the suzerainty of Turkey. The rest of the country is ruled by independent chiefs, while the title of sultan has been assumed by the chief of the Wahabis in Nejd, the sovereign of Oman, and some petty princes in the south of the peninsula. The chief towns are: Mecca, the birthplace of Mohammed; Medina, the place to which he fled from Mecca (A. D. 622), and where he is buried; Mocha, a seaport celebrated for its coffee; Aden, on the s.w. coast, a strongly fortified garrison belonging to Britain; Sana, the capital of Yemen; and Muscat, the capital of Oman, a busy port



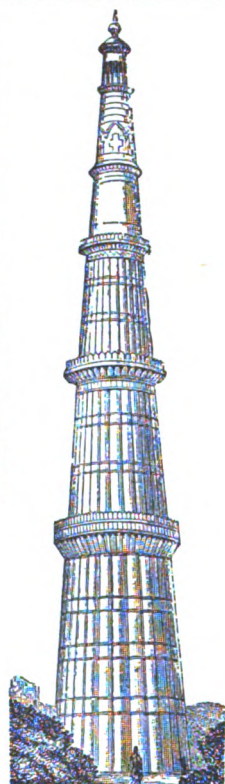
1. Mosque in Delhi.



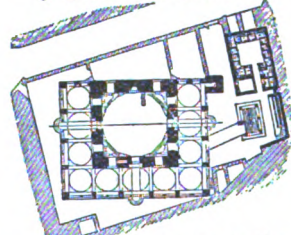
2. Ground Plan of Mosque in Cairo.



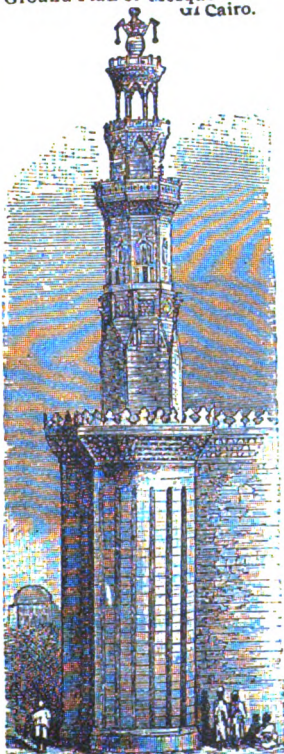
Monument of the Sultan Soliman-ibn-Selim at Cairo.



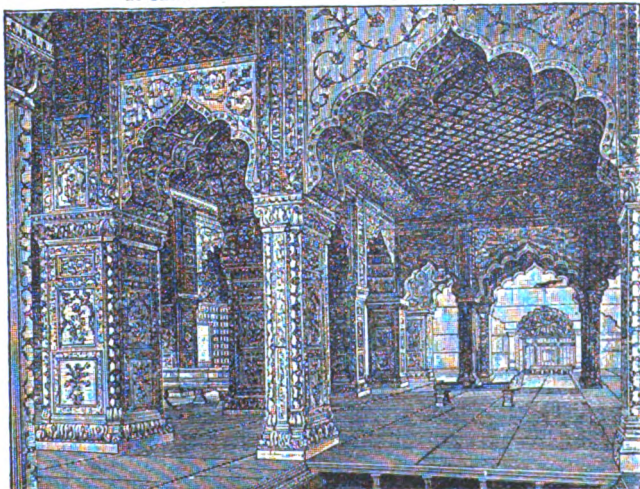
3. Kutab-Minar near Delhi.



5. Ground Plan of Mosque Sinan Pascha, at Bulak, near Cairo.



6. Minaret of Mosque Sultan Hasan, at Cairo.



7. Inp 7. Palace of the Great Mogul at Delhi.

Dehli.

Arabia

with a safe anchorage. The chief towns of the interior are Hafl, the residence of the emir of Northern Nejd; Oneizah, under the same ruler; and Riad, capital of Southern Nejd. The most flourishing portions of Arabia are in Oman, Hadramaut, and Nejd. In the two former are localities with numerous towns and villages and settled industrious populations like that of Hindustan or Europe.

The climate of Arabia in general is marked by extreme heat and dryness. Aridity and barrenness characterize both high and low grounds, and the date-palm is often the only representative of vegetable existence. There are districts which in the course of the year are hardly refreshed by a single shower of rain. Forests there are few or none. Grassy pastures have their place supplied by steppe-like tracts, which are covered for a short season with aromatic herbs, serving as food for the cattle. The date-palm furnishes the staple article of food; the cereals are wheat, barley, maize, and millet; various sorts of fruit flourish; coffee and many aromatic plants and substances, such as gum-arabic, benzoin, mastic, balsam, aloes, myrrh, frankincense, etc., are produced. There are also cultivated in different parts of the peninsula, according to the soil and climate, beans, rice, lentils, tobacco, melons, saffron, colocynth, poppies, olives, etc. Sheep, goats, oxen, the horse, the camel, ass, and mule supply man's domestic and personal wants. Among wild animals are gazelles, ostriches, the lion, panther, hyena, jackal, etc. Among mineral products are saltpeter, mineral pitch, petroleum, salt, sulphur, and several precious stones, as the carnelian, agate, and onyx.

The Arabs, as a race, are of middle stature, of a powerful though slender build, and have a skin of a more or less brownish color; in towns and the uplands often almost white. Their features are well cut, the nose straight, the forehead high. They are naturally active, intelligent, and courteous; and their character is marked by temperance, bravery, and hospitality. The first religion of the Arabs, the worship of the stars, was supplanted by the doctrines of Mohammedanism, which succeeded rapidly in establishing itself throughout Arabia. Besides the two principal sects of Islam, the Sunnites and the Shiites, there also exists, in considerable numbers, a third Mohammedan sect, the Wahabis, which arose in the latter half of the eighteenth century, and for a time possessed great political importance in the peninsula. The mode of life of the Arabs is either nomadic or settled. The nomadic tribes are termed Bedouins, and among them are considered to be the Arabs of the purest blood. Commerce is largely in the hands of foreigners, among whom the Jews and Banians (Indian merchants) are the most numerous.

The history of the Arabs previous to Mohammed is obscure. The earliest inhabitants are believed to have been of the Semitic race. Jews in great numbers migrated into Arabia after the destruction of Jerusalem, and, mak-

Arabia

ing numerous proselytes, indirectly favored the introduction of the doctrines of Mohammed. With his advent the Arabians uprose and united for the purpose of extending the new creed; and under the caliphs—the successors of Mohammed—they attained great power, and founded large and powerful kingdoms in three continents. On the fall of the caliphate of Bagdad in 1258 the decline set in, and on the expulsion of the Moors from Spain the foreign rule of the Arabs came to an end. In the sixteenth century Turkey subjected Hejaz and Yemen, and received the nominal submission of the tribes inhabiting the rest of Arabia. The subjection of Hejaz has continued down to the present day; but Yemen achieved its independence in the seventeenth century, and maintained it till 1871, when the territory again fell into the hands of the Turks. In 1839 Aden was occupied by the British. Oman early became virtually independent of the caliphs, and grew into a well-organized kingdom. In 1507 its capital, Maskat, or Muscat, was occupied by the Portuguese, who were not driven out till 1659. The Wahabis appeared toward the end of the eighteenth century, and took an important part in the political affairs of Arabia, but their progress was interrupted by Mohammed Ali, pasha of Egypt, and they suffered a complete defeat by Ibrahim Pasha. He extended his power over most of the country, but the events of 1840 in Syria compelled him to renounce all claims to Arabia. The Hejaz thus again became subject to Turkish sway. Turkey has since extended its rule not only over Yemen, but also over the district of El-Hasa on the Persian Gulf.

The Arabic language belongs to the Semitic dialects, among which it is distinguished for its richness, softness, and high degree of development. By the spread of Islam it became the sole written language and the prevailing speech in all southwestern Asia and eastern and northern Africa, and for a time in southern Spain, in Malta, and in Sicily; and it is still used as a learned and sacred language wherever Islam is spread. Almost a third part of the Persian vocabulary consists of Arabic words, and there is the same proportion of Arabic in Turkish. The Arabic language is written in an alphabet of its own, which has also been adopted in writing Persian, Hindustani, Turkish, etc. As in all Semitic languages (except the Ethiopic), it is read from right to left. The vowels are usually omitted in Arabic manuscripts, only the consonants being written.

Before the time of Mohammed, poetical contests were held and prizes awarded for the best pieces. The collection called the *Moallakât* contains seven pre-Mohammedan poems by seven authors. Mohammed gave a new direction to Arab literature. The rules of faith and life which he laid down were collected by Abu-Bekr, first caliph after his death, and published by Othman, the third caliph, and constitute the *Koran*—the Mohammedan Bible. The progress of the Arabs

Arabian Nights

in literature, the arts, and sciences, may be said to have begun with the government of the caliphs of the family of the Abbassides, A. D. 749, at Bagdad, several of whom, as Harun al Rashid and Al Mamun, were munificent patrons of learning; and their example was followed by the Omniades in Spain. In Spain important works were written on geography, history, philosophy, medicine, physics, mathematics, arithmetic, geometry, and astronomy. Most of the geography in the Middle Ages is the work of the Arabians, and their historians since the eighth century have been very numerous. The philosophy of the Arabians was of Greek origin, and derived principally from that of Aristotle. Of their philosophical authors the most celebrated are Alfarabi (tenth century), Ibn Sina or Avicenna (d. A. D. 1037), Alghazzali (d. 1111) Ibn Roshd or Averroes (twelfth century), called by pre-eminence, The Commentator. In medicine they excelled all other nations in the Middle Ages, and they are commonly regarded as the earliest experimenters in chemistry. Their mathematics and astronomy were based on the works of Greek writers, but the former they enriched, simplified, and extended. It was by them that algebra (a name of Arabic origin) was introduced to the Western peoples, and the Arabic numerals were similarly introduced. Astronomy they especially cultivated, and observatories were erected at Bagdad and Cordova. The *Almagest* of Ptolemy, in an Arabic translation, was early a text-book among them. Among poets were Abu Nowas, Asmai, Abu Temmam, Motenabbi, Abul-Ala, Busiri, Tograi, and Hariri. Tales and romances in prose and verse were written. The tales of fairies, genii, enchanters, and sorcerers in particular, passed from the Arabians to the Western nations, as in *The Thousand and One Nights*. At the present day Arabic literature is almost confined to the production of commentaries and scholia, discussions on points of dogma and jurisprudence, and grammatical works on the classical language. There are a few newspapers published in Arabic.

Arabian Nights (or *The Thousand and One Nights*), a celebrated collection of Eastern tales, long current in the East, and supposed to have been derived by the Arabians from India, through the medium of Persia. They were first introduced into Europe in the beginning of the eighteenth century by means of the French translation of Antoine Galland. Of some of them no original MS. is known to exist; they were taken down by Galland from the oral communication of a Syrian friend. The story which connects the tales of *The Thousand and One Nights* is as follows: The Sultan Shahriyar, exasperated by the faithlessness of his bride, made a law that every one of his future wives should be put to death the morning after marriage. At length one of them, Shahrazad, the generous daughter of the grand-vizier, succeeded in abolishing the cruel custom. By the charm of her stories the fair narrator induced the sultan to defer

Arago

her execution every day till the dawn of another, by breaking off in the middle of an interesting tale which she had begun to relate. In the form we possess them these tales belong to a comparatively late period, though the exact date of their composition is not known. Lane, who published a translation of a number of the tales, with valuable notes, is of the opinion that they took their present form some time between 1475 and 1525. Two complete English translations have recently been printed, giving many passages that previous translators had omitted on the score of morality or decency.

Arabian Sea, the part of the Indian Ocean between Arabia and India.

Arabic Figures, the characters 1, 2, 3, 4, 5, 6, 7, 8, 9, 0; of Indian origin, introduced into Europe by the Moors. They did not come into general use till after the invention of printing.

Aracan (ar-a-kan'), the most northern division of Lower Burmah, on the Bay of Bengal; Area 14,526 sq. mi.; pop. 587,518. Ceded to the English in 1826, as a result of the first Burmese war.

Arachis (ar'a-kis), a genus of leguminous plants much cultivated in warm climates, and esteemed a valuable article of food. The most remarkable feature of the genus is that when the flower falls the stalk supporting the small, undeveloped fruit lengthens, and bending toward the ground pushes the fruit into the ground, when it begins to enlarge and ripen. The pod of arachis (popularly called ground-, earth-, or pea-nut) is of a pale yellow color, and contains two seeds the size of a hazel-nut, in flavor sweet as almonds, and yields when pressed an excellent oil. See *Peanut*.

Arachnida (a-rak'ni-da), a class of animals, including the spiders, scorpions, mites, ticks, etc. They have the body divided into a number of segments or *somites*, some of which have always articulated appendages (limbs, etc.).

Arad (órod), a town of Hungary, on the Maros, 30 mi. n. of Temeswar, divided by the river into O (Old) Arad and Uj (New) Arad, connected by a bridge; it has a fortress, and is an important railway center, with a large trade and manufactures. Pop. Old Arad, 35,556; New Arad, 5,141.

Arafat (or Jebel er Rahmeh) ("Mountain of Mercy"), a hill in Arabia, about 200 ft. high, with stone steps reaching to the summit, 15 mi. s. e. of Mecca; one of the principal objects of pilgrimage among Mohammedans, who say that it was the place where Adam first received his wife Eve, after they had been expelled from Paradise and separated from each other 120 years. A sermon delivered on the mount constitutes the main ceremony of the Hadj or pilgrimage to Mecca, and entitles the hearer to the name and privileges of a Hadji, or pilgrim.

Ar'ago, DOMINIQUE FRANCOIS (1786-1853), a celebrated French scientist and statesman; was an investigator especially in physics and astronomy, made important discoveries in magnetism and optics, and was a skilful

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popular writer on these subjects. As a statesman he is famous as a close friend of Napoleon the Great, and later as a champion of republican institutions and liberties. Arago graduated from the polytechnic school in 1805, and was appointed to a commission which was making certain measurements of longitude that were to serve as the basis of a decimal metric system. While engaged in this work he was taken prisoner as a spy by the Spaniards (1808), underwent hardships and narrow escapes, but finally reached Marseilles, 1809. Arrived at Paris, he was at once elected a member of the Institute, though only 23 years old, was appointed a professor at the polytechnic school, and in 1830 became perpetual secretary of the Academy of Sciences and director of the observatory. These offices he retained until his death. He rendered great service to the science of optics, and made valuable contributions to meteorology, especially in connection with electricity. In 1829 Arago received the Copley medal from the London Royal Society, being the first Frenchman to be awarded that honor. Napoleon invited Arago to accompany him to the U. S., whither he thought of coming after Waterloo, to devote the rest of his life to scientific pursuits. Arago was urged to accompany him to St. Helena, but refused. In the Revolution of 1830, Arago supported the cause of the people. He was elected a member of the Chamber of Deputies in 1831, and there made many famous speeches, in behalf of education, science, and especially the rights of the people. He opposed the government monopoly of railways. Arago was president of the Council General of the Seine until 1849, and was the chief instrument in the emancipation of slaves. He was active in the overthrow of Louis Philippe, 1848, was a member of the provisional government and afterward minister of war and marine. As a member of the executive commission he displayed great courage in the Revolution of 1848. He favored liberal institutions as exemplified in the U. S. He opposed the election of Louis Napoleon to the presidency, and after the *coup d'état* of 1857, refused to take oath to his government, remaining true to his republican principles. The last three years of his life he was blind. Arago was the author of about sixty scientific works and memoirs.

Aragón, kingdom of, a former province or kingdom of Spain, now divided into the three provinces of Teruel, Huesca, and Saragossa. Area 14,726 sq. mi. It was governed by its own monarchs until the union with Castile on the marriage of Ferdinand and Isabella (1469). Pop. 909,261.

Araguaya (â-râ-gwî'â), a Brazilian river, length, about 1,300 mi., of which over 1,000 are navigable.

A'ral, a salt-water lake in Asia, in Russian territory, about 150 mi. west of the Caspian Sea. Area 26,650 sq. mi. It receives the Amoo Daria or Oxus and the Sir Daria or Jaxartes, and contains a multitude of sturgeon

Araucanians

and other fish. It has no outlet. The Aral contains a large number of small islands; steamers have been placed on it by the Russians.

Aramæ'an (or Aramaic), a Semitic language nearly allied to the Hebrew and Phœnician, anciently spoken in Syria and Palestine and eastward to the Euphrates and Tigris, being the official language of this region under the Persian domination. In Palestine it supplanted Hebrew, and it was it and not the latter that was the tongue of the Jews in the time of Christ. Parts of Daniel and Ezra are written in Aramaic, or, as this form of it is often incorrectly named, Chaldee, from an old notion that the Jews brought it from Babylon. An important Aramaic dialect is the Syriac, in which there is an extensive Christian literature.

Aranjuez (â-rân-ly-eth'), a small town and palace in Spain, 30 mi. from Madrid, with splendid gardens laid out by Philip II. The court used to reside here from Easter till the close of June, when the number of people increased from 4,000 to about 20,000.

Arap'ahoes, a tribe of American Indians once located near the head-waters of the Arkansas and Platte rivers, not now of any importance. The survivors are located in the Indian Territory.

Ar'arat, a celebrated mountain in Armenia, forming the point of contact of Russia with Turkey and Persia; an isolated volcanic mass showing two separate cones known as the Great and Little Ararat, resting on a common base and separated by a deep intervening depression. The elevations are: Great Ararat, 16,916 feet; Little Ararat, 12,840 feet; the connecting ridge, 8,780 feet. Vegetation extends to 14,200 feet, which marks the snow-line. According to tradition Mount Ararat was the resting-place of the ark when the waters of the flood abated.



Araucanians.

Arauca'nians, a South American native race in the southern part of Chile. They are warlike and more civilized than many of the

Araucaria

native races of S. America, and maintained almost unceasing war with the Spaniards from 1537 to 1773, when their independence was recognized by Spain, though their territory was much curtailed. Their early contests with the Spaniards were celebrated in Ercilla's Spanish poem *Araucana*. With the republic of Chile they were long at feud, and latterly had at their head a French adventurer named Tonneins, who claimed the title of king. In 1882 they submitted to Chile. The Chilean province of Arauco receives its name from them.

Arauca'ria, a genus of trees of the coniferous or pine order, belonging to the southern hemisphere. The species are large evergreen trees with pretty large, stiff, flattened, and generally imbricated leaves, verticillate spreading branches, and bearing large cones, each scale having a single large seed. Its seeds are eaten when roasted. The Moreton Bay pine, of N. S. Wales supplies a valuable timber used in house and boat building, in making furniture, and in other carpenter work. Another species, the Norfolk Island pine, abounds in several of the South Sea Islands, where it attains a height of 220 feet with a circumference of 30 feet and is described as one of the most beautiful of trees. Its foliage is light and graceful, and quite unlike that of the Chile pine, having nothing of its stiff formality. Its timber is of some value, being white, tough, and close-grained.

Arau'co, a province of Chile, named from the Araucanian Indians. Area 4,246 sq. mi.; pop. 73,658; capital, Lebu.

Ar'baces, one of the generals of Sardana-pälus, king of Assyria. He revolted and defeated his master, and became the founder of the Median Empire 846 B. C.

Arbe'la (now *Erbil*), a place in the Turkish vilayet of Bagdad, giving name to the decisive battle fought by Alexander the Great against Darius, at Gaugamela, about 20 mi. distant from it, Oct. 1, B. C. 331.

Arbitra'tion, the hearing and determination of a cause between parties in controversy, by a person or persons chosen by the parties. This may be done by one person, but it is common to choose more than one. Frequently two are nominated, one by each party, with a third, the *umpire*, who is called on to decide in case of the primary arbitrators differing. In such a case the umpire may be agreed upon either by the parties themselves, or by the arbitrators, when they have received authority from the parties to the dispute to settle this point. The determination of arbitrators is called an *award*. The disputes of nations were formerly arbitrated only by war, but in this regard the U. S. has set a high example to the world by repeatedly inviting arbitration in international disputes. Her notable triumphs in this respect include the Alabama, Bering Sea, and Venezuela boundary disputes.

Arbor Day, a day designated by legislative enactment, in the different states, for the voluntary planting of trees by the people; the pupils in the public schools now take part in

Arcade

the observance of the day. It was inaugurated in 1874 by the Nebraska state board of agriculture at the suggestion of Julius Sterling Morton, afterwards secretary of agriculture in President Cleveland's second administration. Nearly every one of the states has already established an annual Arbor Day, and observes it as a legal holiday.

Arbor Vitæ ("tree of life"), the name of several coniferous trees, allied to the cypress, with flattened branchlets, and small imbricated or scale-like leaves. The common Arbor Vitæ is a native of N. America, where it grows to the height of 40 or 50 feet. The young twigs have an agreeable balsamic smell. The Chinese Arbor Vitæ, common in Britain, yields a resin which was formerly thought to have medicinal virtues.

Ar'butus, a genus of plants belonging to the heath order, and comprising a number of small trees and shrubs, natives chiefly of Europe and N. America.



Arbutus. a.—fruit: b.—section of fruit.

The trailing arbutus or May-flower of N. America, a plant with fragrant and beautiful blossoms, is of the same natural order.

Arcade, a series of arches supported on piers or pillars, used generally as a screen and support of a roof, or of the wall of a building, and having beneath the covered part an ambulatory as round a cloister, or a footpath with shops or dwellings, as frequently seen in old Italian towns. Sometimes a porch or other prominent part of an important building is treated with arcades.

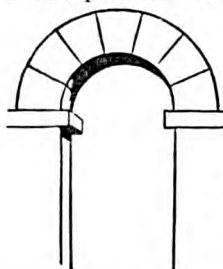
At the present day Bologna, Padua, and Berne have fine examples of mediæval arcaded streets, and among more modern work various streets in Turin, and the Rue de Rivoli, Paris, are lined with arcades, with shops underneath. In mediæval architecture the term arcade is also applied to a series of arches supported on pillars forming an ornamental dressing or enrichment of a wall, a mode of treatment of very frequent occurrence in the towers, apses, and other parts of churches. In modern use the name arcade is often applied to a passage

Arcadia

or narrow street containing shops arched over and covered with glass; as for example, the Burlington Arcade, London, and the Galleria Vittorio Emanuele, in Milan.

Arcadia, the central and most mountainous portion of the Peloponnesus (Morea), the inhabitants of which in ancient times were celebrated for simplicity of character and manners. Their occupation was almost entirely pastoral, and thus the country came to be regarded as typical of rural simplicity and happiness. At the present day Arcadia forms a nomarchy of the kingdom of Greece. Area 2,028 sq. mi.; pop. 148,600.

Arch, a structure composed of separate pieces, such as stones or bricks, having the shape of truncated wedges, arranged on a curved line, so as to retain their position by mutual pressure. The separate stones which



Arch.

compose the curve of an arch are called *voussoirs* or *arch-stones*; the extreme or lowest voussoirs are termed *springers*, and the uppermost or central one is called the *keystone*. The under or concave side of the voussoirs is called the *intrados*, and the upper or convex side the *extrados*, of the arch.

The supports which afford resting and resisting points to the arch are called *piers* and *abutments*. The upper part of the pier or abutment where the arch rests—technically where it *springs from*—is the *impost*. The *span* of an arch is its circular arches the length of its chord, and generally the width between the points of its opposite imposts whence it springs. The *rise* of an arch is the height of the highest point of its intrados above the line of the imposts; this point is sometimes called the *under side of the crown*, the highest point of the extrados being the *crown*. Arches are designated in various ways, as from their shape (circular, elliptic, etc.), or from the resemblance of the whole contour of the curve to some familiar object (lancet arch, horse-shoe arch), or from the method used in describing the curve, as equilateral, three-centered, four-centered, ogee, and the like; or from the style of architecture to which they belong, as Roman, pointed, and Saracenic arches. *Triumphal arch*, originally a simple decorated arch under which a victorious Roman general and army passed in triumph. At a later period the triumphal arch was a richly sculptured, massive, and permanent structure, having an archway passing through it, with generally a smaller arch on either side. The name is sometimes given to an arch, generally of wood decorated with flowers or evergreens, erected on occasion of some public rejoicing, etc.

Archæol'ogy, the science which takes cognizance of the history of nations and peoples as evinced by the remains, architectural, implemental, or otherwise, which belong to the

Archery

earlier epoch of their existence. In a more extended sense the term embraces every branch of knowledge which bears on the origin, religion, laws, language, science, arts, and literature of ancient peoples. It is to a great extent synonymous with *prehistoric annals*, as a large if not the principal part of its field of study extends over those periods in the history of the human race in regard to which we possess almost no information derivable from written records. Archæology divides the primeval period of the human race, more especially as exhibited by remains found in Europe, into the Stone, the Bronze, and the Iron Age, these names being given in accordance with the materials employed for weapons, implements, etc., during the particular period. The Stone Age has been subdivided into the Palæolithic and Neolithic, the former being that older period in which the stone implements were not polished as they are in the latter and more recent period. The Bronze Age, which admits of a similar subdivision, is that in which implements were of copper or bronze. In this age the dead were burned and their ashes deposited in urns or stone chests, covered with conical mounds of earth or cairns of stones. Gold and amber ornaments appear in this age. The Iron Age is that in which implements, etc., of iron begin to appear, although stone and bronze implements are found along with them. The word *age* in this sense (as explained under *Age*) simply denotes the stage at which a people has arrived. The phrase "Stone Age," therefore, merely marks the period before the use of bronze, the "Bronze Age" that before the employment of iron, among any specific people.

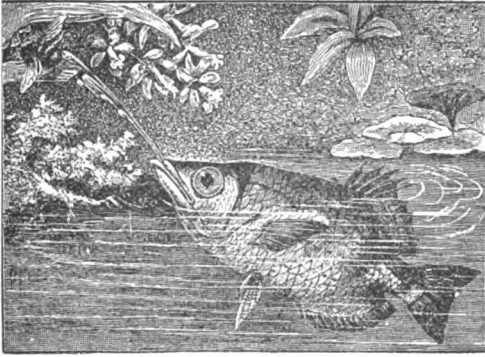
Archangel (ärk-an'jel), a seaport, capital of the Russian government of same name, on the right bank of the northern Dwina, about 20 mi. above its mouth in the White Sea. The place has some manufactures and an important trade, exporting linseed, flax, tow, tallow, train-oil, mats, timber, pitch and tar, etc. The port is closed for six months by ice. Archangel, founded in 1584, was long the only port which Russia possessed. Pop. 19,540. The province has an area of 331,490, sq. mi. Pop. 311,673.

Archelaus (är-kē-lä'us), the name of several personages in ancient history, one of whom was the son of Herod the Great. He received from Augustus the sovereignty of Judea, Samaria, and Idumea. The people, tired of his tyrannical and bloody reign, accused him before Augustus, who banished him to Gaul.

Archer-fish, a name given to a scaly-finned fish, about 6 inches long, inhabiting the seas around Java, which has the faculty of shooting drops of water to the distance of 3 or 4 feet at insects, thereby causing them to fall into the water, when it seizes and devours them. The soft, and even the spiny portion of their dorsal fins are so covered with scales as to be scarcely distinguishable from the rest of the body.

Arch'ery, the art of shooting with a bow and arrow. The use of these weapons in war

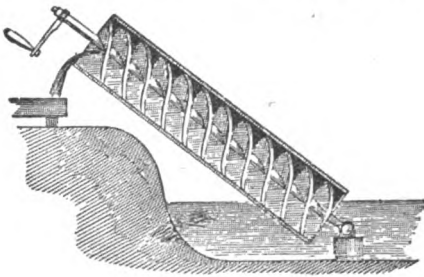
Archimedean Screw



Archer Fish.

and the chase dates from the earliest antiquity. Ishmael, we learn from Genesis 21, "became an archer." The Egyptians, Assyrians, Persians, and Parthians excelled in the use of the bow; and while the Greeks and Romans themselves made little use of it they employed foreign archers as mercenaries. Coming to much more recent times we find the American Indians exceedingly skilful archers. The Swiss archers generally use the arbalist or cross-bow. The English victories of Crécy, Poitiers, and Agincourt may be ascribed to the bowmen. Archery disappeared gradually as firearms came into use, and as an instrument of war or the chase the bow is now confined to the most savage tribes of both hemispheres. But though the bow has been long abandoned among civilized nations as a military weapon, it is still cherished as an instrument of healthful recreation. In recent years a number of archery clubs have been formed in the U. S. Archery has the merit of forming a sport open to women as well as men.

Archimede'an Screw, a machine for raising water, said to have been invented by Archimedes, during his stay in Egypt, for irrigating the land. It is formed by winding a tube spirally round a cylinder so as to have



Archimedean Screw.

the form of a screw, or by hollowing out the cylinder itself into a double or triple threaded screw and inclosing it in a water-tight case. When the screw is placed in an inclined position and the lower end immersed in water, by

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causing the screw to revolve, the water may be raised to a limited extent.

Archimedes (ār-ki-me'dēz), a celebrated ancient Greek physicist and geometrician, born at Syracuse, in Sicily, about 287 B. C. He devoted himself entirely to science, and enriched mathematics with discoveries of the highest importance, upon which the moderns have founded their admeasurements of curvilinear surfaces and solids. Archimedes is the only one among the ancients who has left us anything satisfactory on the theory of mechanics and on hydrostatics. He first taught the hydrostatic principle to which his name is attached, "that a body immersed in a fluid loses as much in weight as the weight of an equal volume of the fluid," and determined by means of it that an artist had fraudulently added too much alloy to a crown which King Hiero had ordered to be made of pure gold. He discovered the solution of this problem while bathing; and it is said to have caused him so much joy that he hastened home from the bath undressed, and crying out, *Eureka! Eureka!* "I have found it, I have found it!" Practical mechanics also received a great deal of attention from Archimedes, who boasted that if he had a fulcrum or standpoint he could move the world. He is the inventor of the compound pulley, probably of the endless screw, the Archimedean screw, etc. During the siege of Syracuse by the Romans he is said to have constructed many wonderful machines with which he repelled their attacks, and he is stated to have set on fire their fleet by burning-glasses! At the moment when the Romans gained possession of the city by assault (212 B. C.) tradition relates that Archimedes was slain while sitting in the market-place contemplating some mathematical figures which he had drawn in the sand.

Architec'ture, in a general sense, is the art of designing and constructing houses, bridges, and other buildings for the purposes of civil life; or, that branch of the fine arts which has for its object the production of edifices not only convenient but characterized by unity, beauty, and grandeur. The first habitations of man were caves, huts, and tents. But as soon as men rose in civilization they began to build more commodious and comfortable habitations. They prepared bricks of clay or earth, which they at first dried in the air, but afterward baked by fire; and latterly they smoothed stones and joined them with mortar or cement. After they had learned to build houses, they erected temples for their gods on a larger and more splendid scale than their own dwellings. The Egyptians are the most ancient nation known to us among whom architecture had attained the character of a fine art. Other ancient peoples among whom it had made great progress were the Babylonians, whose most celebrated buildings were temples, palaces, and hanging-gardens; the Assyrians, whose capital, Nineveh, was rich in splendid buildings; the Phœnicians, whose cities, Sidon, Tyre,

etc., were adorned with equal magnificence; and the Israelites, whose temple was a wonder of architecture. But comparatively few architectural monuments of these latter nations have remained till our day. This is not the case with the architecture of Egypt, however, of which we possess ample remains in the shape of pyramids, temples, sepulchres, obelisks, etc. The Egyptian temples had walls of great thickness and sloping on the outside from bottom to top; the roofs were flat, and composed of blocks of stone reaching from one wall or column to another. The principle of the arch was not employed for architectural purposes. Statues of enormous size, sphinxes carved in stone, and on the walls sculptures in outline of deities and animals, with innumerable hieroglyphics, are the decorative objects which belong to this style. In historic times the Greeks developed an architecture of noble simplicity and dignity, in part derived from the Egyptian. It is considered to have attained its greatest perfection in the age of Pericles, or about 460-430 B. C. The great masters of this period were Phidias, Ictinus, Callicrates, etc. All the extant buildings are more or less in ruins. The style is characterized by beauty, harmony, and simplicity in the highest degree. The Greeks had three orders, called respectively the *Doric*, *Ionic*, and *Corinthian*. See articles under these names. Greek buildings were abundantly adorned with sculptures, and painting was extensively used, the details of the structures being enriched by different colors or tints. Lowness of roofs and the absence of arches were distinctive features of Greek architecture. The most remarkable public edifices of the Greeks were temples, of which the most famous is the Parthenon at Athens. Their theaters were semicircular on one side and square on the other, the semicircular part being usually excavated in the side of some convenient hill. This part, the auditorium, was filled with concentric seats, and might be capable of containing 20,000 spectators. A number exist in Greece, Sicily, and Asia Minor, and elsewhere. After the death of Alexander the Great (323) the decline was very marked. The Romans early took the foremost place in the construction of such works as aqueducts and sewers, the arch being in extensive use among this people. As a fine art, Roman architecture had its origin in copies of the Greek models. Their number, moreover, was augmented by the addition of two new orders—the *Tuscan* and the *Composite*. Rome attained, under Augustus, its greatest perfection in architecture. Among the great works now erected were temples, aqueducts, amphitheaters, magnificent villas, triumphal arches, monumental pillars, etc. The *amphitheater* differed from the theater in being a completely circular or rather elliptical building, filled on all sides with ascending seats for spectators and leaving only the central space, called the *arena*, for the combatants and public shows. The Coliseum is a stupendous structure of this kind. The *thermæ*, or baths, were vast struc-

tures in which multitudes of people could bathe at once. The excavations at Pompeii in particular have thrown great light on the internal arrangements of the Roman dwelling-house. After the period of Hadrian (117-138 A. D.) Roman architecture is considered to have been on the decline. In Constantinople, after its virtual separation from the Western Empire, arose a style of art and architecture which was practised by the Greek Church during the whole of the Middle Ages. This is called the Byzantine style. The church of St. Sophia at Constantinople, built by Justinian (reigned 527-565), offers the most typical specimen of the style, of which the fundamental principle was an application of the Roman arch, the dome being the most striking feature of the building. In the most typical examples the dome or cupola rests on four pendentives.

After the dismemberment of the Roman Empire the beautiful works of ancient architecture were almost entirely destroyed by the Goths, Vandals, and other barbarians in Italy, Greece, Asia, Spain, and Africa; or what was spared by them was ruined by the fanaticism of the Christians. A new style of architecture now arose, two forms of which, the Lombard and the Norman-Romanesque, form important phases of art. The Lombard prevailed in north Italy and south Germany from the eighth or ninth to the thirteenth century (though the Lombard rule came to an end in 774). The semicircular arch is the characteristic feature of the Norman-Romanesque style, which flourished in England from the eleventh to the middle of the thirteenth century. With the Lombard-Romanesque were combined Byzantine features, and buildings in the pure Byzantine style were also erected in Italy, as the Church of St. Mark at Venice.

The conquests of the Moors introduced a fresh style of architecture into Europe after the eighth century—the Moorish or Saracenic. The edifices erected by the Moors and Saracens in Spain, Egypt, and Turkey, are distinguished, among other things, by a peculiar form of the arch, which forms a curve constituting more than half a circle or ellipse. A peculiar flowery decoration, called *arabesque*, is a common ornament of this style, of which the building called the Alhambra is perhaps the chief glory.

The Germans were unacquainted with architecture until the time of Charlemagne (or Charles the Great, 742-814). He introduced into Germany the Byzantine and Romanesque styles. Afterward the Moorish or Arabian style had some influence upon that of the Western nations, and thus originated the mixed style which maintained itself till the middle of the thirteenth century. Then began the modern Gothic style, which grew up in France, England, and Germany. Its striking characteristics are its pointed arches, its pinnacles and spires, its large buttresses, clustered pillars, vaulted roofs, profusion of ornament, and, on the whole, its

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lofty, bold character. Its most distinctive feature, as compared with the Greek or the Egyptian style, is the predominance in it of perpendicular or rising lines, producing forms that convey the idea of soaring or mounting upward. Its greatest capabilities have been best displayed in ecclesiastical edifices. The Gothic style is divided into four principal epochs: The Early Pointed, or general style of the thirteenth century; the Decorated, or style of the fourteenth century; the Perpendicular, practised during the fifteenth and early part of the sixteenth centuries; and the Tudor, or general style of the sixteenth century. This style lasted in England up to the seventeenth century, being gradually displaced by that branch of the Renaissance or modified revival of ancient Roman architecture which is known as the *Elizabethan style*, and which is perhaps more purely an English style than any other that can be named. The rise of the Renaissance style in Italy is the greatest event in the history of architecture after the introduction of the Gothic style. The Gothic style had been introduced into the country and extensively employed, but had never been thoroughly naturalized. The Renaissance is a revival of the classic style based on the study of the ancient models; and having practically commenced in Florence about the beginning of the fifteenth century, it soon spread with great rapidity over Italy, and the greater part of Europe. The most illustrious architects of this early period of the style were Brunelleschi, who built at Florence the dome of the cathedral, the Pitti Palace, etc., besides many edifices at Milan, Pisa, Pesaro, and Mantua; Alberti, who wrote an important work on architecture, and erected many admired churches; Bramante, who began the building of St. Peter's, Rome; and Michael Angelo, who erected its magnificent dome. On St. Peter's were also employed Raphael, Peruzzi, and San Gallo.

Since the Renaissance period there has been no architectural development requiring special note. In edifices erected at the present day some one of the various styles of architecture is employed according to taste. Modern dwelling-houses have necessarily a style of their own as far as stories, and apartments, and windows, and chimneys can give them one. In general the Grecian style, as handed down by Rome, and modified by the Italian architects of the Renaissance, from its right angles and straight entablatures, is more convenient, and fits better with the distribution of our common edifices, than the pointed and irregular Gothic. But the occasional introduction of the Gothic outline and the partial employment of its ornaments has undoubtedly an agreeable effect, both in public and private edifices; and we are indebted to it, among other things, for the spire, a structure exclusively Gothic, which, though often misplaced, has become an object of general approbation, and a pleasing landmark to cities and villages.

Architecture

The works most characteristic of the present day are the grand bridges, viaducts, etc., in many of which iron is the sole or most characteristic portion of the material. The U. S., Canada, and the Australian colonies have not been backward in following the lead of the older countries of Europe. In America the increase in the number of handsome buildings has been very noteworthy since the termination of the Civil War, and the architectural accomplishments of the World's Columbian Exposition at Chicago, in 1893, have never been excelled in any country.

A new era has dawned in the construction of high buildings. "Chicago construction" is a term applied to the new method of building high structures, having a steel frame skeleton, starting with the foundation and built up complete like a bridge. This method originated in Chicago. Each floor is absolutely independent so far as the walls and partitions are concerned, for the walls have nothing but their own weight to carry in the height of each story. The contractor may begin exterior work on the third, fifth, or any story he pleases, and leave the first to be enclosed after every other floor has been walled in and plastered. The steel framework is put up as rapidly as possible so as to get the roof on to protect the interior from the weather. Then the hollow tile partitions or the walls are built in as desired. This method of building ignores the massive foundations, heavy piers, the use of thick walls, and solid partition walls, running from the foundation to the roof. In this system, the columns, starting from the foundations, can carry the floors as well as partitions and thus permit any arrangement of a floor without interfering with the construction. The demand for high buildings set the architects to work to solve the problem of overcoming the instability of the original soil of Chicago. In Chicago construction the foundations are made of steel railroad rails, or "I" beams. First a bed of concrete is laid, and on this is placed a layer of rails, or beams placed side by side. On this bottom layer another layer of rails or beams is laid, crossing the lower members of the foundation at right angles. On top of the rails a cast iron plate is laid. This is the shoe for the steel column. The column is always made of wrought steel, and is of the same size for each of two stories, diminishing in size as it nears the roof. The entire framework is riveted together with hot rivets. Every piece of exposed steel work is completely surrounded with some fire-proof material, such as blocks of tile or brick.

A few words may be added on the architecture of India and China. Although many widely differing styles are to be found in India, the oldest and only true native style of Indian ecclesiastical architecture is the Buddhist, the earliest specimens dating to 250 B. C. Among the chief objects of Buddhist art are *stupas* or *topes*, built in the form of large towers, and employed as *dagobas* to contain relics of Buddha or of some noted saint. Other works

of Buddhist art are temples or monasteries excavated from the solid rock, and supported by pillars of the natural rock left in their places. Buddhist architecture is found in Ceylon, Thibet, Java, etc., as well as in India. The most remarkable Hindu or Brahmanical temples are in southern India. They are pyramidal in form, rising in a series of stories. The Saracenic or Mohammedan architecture latterly introduced into India is of course of foreign origin. The Chinese have made the *tent* the elementary feature of their architecture; and of their style any one may form an idea by inspecting the figures which are depicted upon common chinaware. Chinese roofs are concave on the upper side, as if made of canvas instead of wood. (For further information on the different subjects pertaining to architecture see separate articles on the different styles, Greek, Roman, Gothic, etc., and such entries as *Arch*, *Column*, *Aqueduct*, *Corinthian*, *Doric*, *Ionian*, *Theater*).

Archytas (ar-ki'tas), an ancient Greek mathematician, statesman, and general, who flourished about 400 B. C., and belonged to Tarentum in southern Italy. The invention of the analytic method in mathematics is ascribed to him, as well as the solution of many geometrical and mechanical problems. He constructed various machines and automata, among which was his flying pigeon. He was a Pythagorean in philosophy, and Plato and Aristotle are said to have been both deeply indebted to him. Only inconsiderable fragments of his works are extant.

Arcis-sur-Aube (ar-sē-sur-ōb), a small town of France, dep. Aube, at which, in 1814, was fought a battle between Napoleon and the allies, after which the latter marched to Paris. Pop. 2,928.

Arc-light, that species of the electric light in which the illuminating source is the current of electricity passing between two sticks of carbon kept a short distance apart, one of them being in connection with the positive, the other with the negative terminal of a battery or dynamo.

Arcole (ar'ko-lā), a village in north Italy, 15 mi. S. E. of Verona, celebrated for the battles of Nov. 15, 16, and 17, 1796, fought between the French under Bonaparte and the Austrians, in which the latter were defeated with great slaughter.

Ar'cot, two districts and a town of India, within the Presidency of Madras.—**NORTH ARCOT** is an inland district with an area of 7,256 sq. mi. The country is partly flat and partly mountainous, where intersected by the eastern Ghāts. Pop. 1,817,814.—**SOUTH ARCOT** lies on the Bay of Bengal, and has two seaports, Cuddalore and Porto Novo. Pop. 1,814,738.—The town Arcot is in north Arcot, on the Palar, about 70 mi. W. by S. of Madras. There is a military cantonment at 3 miles' distance. Pop. 12,000.

Arctic (ark'tik), an epithet given to the north pole from the proximity of the constellation of the Bear, in Greek called *arktos*. The *Arctic Circle* is an imaginary circle on

the globe, parallel to the equator, and 23° 28' distant from the north pole. This and its opposite, the *Antarctic*, are called the two polar circles.

Arctic Ocean, that part of the water surface of the earth which surrounds the north pole, and washes the northern shores of Europe, Asia, and America; its southern boundary roughly coinciding with the Arctic Circle. It incloses many large islands, and contains large bays and gulfs which deeply indent the northern shores of the three continents. Its great characteristic is ice, which is nearly constant everywhere.

Arctic Regions, the regions around the north pole, and extending from the pole on all sides to the Arctic Circle. The Arctic or North Polar Circle just touches the northern headlands of Iceland, cuts off the southern and narrowest portion of Greenland, crosses Fox's Strait north of Hudson's Bay, whence it goes over the American continent to Bering's Strait. Thence it runs to Obdorsk at the mouth of the Obi, then crossing northern Russia, the White Sea, and the Scandinavian Peninsula, returns to Iceland. Though much skill and heroism have been developed in the exploration of this portion of the earth, there is still an area round the pole estimated at 2,500,000 sq. mi., which is a blank to geographers. Many have adopted the belief in the existence of an open polar sea about the north pole; but this belief is not supported by any positive evidence. Valuable minerals, fossils, etc., have been discovered within the Arctic regions. In the archipelago north of the American continent excellent coal frequently occurs. The mineral cryolite is mined in Greenland. Fossil ivory is obtained in the islands at the mouth of the Lena. In Scandinavia, parts of Siberia, and northwest America, the forest region extends within the Arctic Circle. The most characteristic of the natives of the Arctic regions are the Esquimaux. The most notable animals are the white-bear, the musk-ox, the reindeer, and the whalebone whale. Fur-bearing animals are numerous. The most intense cold ever registered in those regions was 74° below zero F. The aurora borealis is a brilliant phenomenon of Arctic nights.

Arctu'rus, a fixed star of the first magnitude in the constellation of Boötes, and thought by some to be the nearest to our system of any of the fixed stars. It is one of the stars observed to have a motion of its own, and is a noticeable object in the northern heavens.

Ar'dea, the genus of birds to which the heron belongs, which includes also cranes, storks, bitterns, etc.

Ar'dèche (ar-dāsh), a dep. in the south of France (Languedoc). Area 2,134 sq. mi. It is generally of a mountainous character, and contains the culminating point of the Cevennes. Silk and wine are produced. Annonay is the principal town, but Privas is the capital. Pop. 375,472.

Ardennes (ar-den'), an extensive tract of hilly land stretching over a large portion of the

Ardennes

northeast of France and the southwest of Belgium. Anciently the whole tract formed one immense forest (*Arduenna Silva* of Cæsar); but though extensive districts are still under wood, large portions are now occupied by cultivated fields and populous towns.

Ardennes (ar-den'), a frontier department in the northeast of France; area 2,020 sq. mi., partly consisting of the Forest of Ardennes. There are extensive slate-quarries, numerous iron works, and important manufactures of cloth, ironware, leather, glass, earthenware, etc. Chief towns, Mézières (the capital), Rocroi, and Sedan. Pop. 332,759.

Are (är), the unit of the French land measure, equal to a hundred square meters, or 1,076.44 square feet. A *hectare* is 100 ares, equal to 2.47 acres.

Are'ca, a genus of lofty palms with pin-nated leaves, and a drupe-like fruit enclosed in a fibrous rind. One species of the Coromandel and Malabar coasts is the common areca palm which yields areca or betel nuts, and also the astringent juice catechu. Another is the cabbage-tree or cabbage-palm of the West Indies. With lime and the leaves of the betel-pepper, the areca-nuts when green form the celebrated masticatory of the East. They are an important article in Eastern trade.

Arecibo (ä-re-thō'bō), a seaport town on the north coast of the island of Porto Rico. Pop. 10,000.

Are'na, the inclosed space in the central part of the Roman amphitheaters, in which took place the combats of gladiators or wild beasts. It was usually covered with sand or sawdust to prevent the gladiators from slipping, and to absorb the blood.

Areometer. See *Hydrometer*.

Areopagus, the oldest of the Athenian courts of justice. It obtained its name from its place of meeting, on the Hill of Ares (Mars), near the citadel. It existed from very remote times, and the crimes tried before it were wilful murder, poisoning, robbery, arson, dissoluteness of morals, and innovations in the state and in religion.

Arequipa (a-rä-kō'pá), a city of Peru, 200 mi. s. of Cuzco, situated in a fertile valley, 7,850 feet above sea-level. Before the earthquake of 1868, which almost totally destroyed it, it was one of the best-built towns of South America. Behind the city rises the volcano of Arequipa, or Peak of Misté (20,328 feet). A considerable trade is carried on through Molendo, which has superseded Islay as the port of Arequipa, and is connected with it by railway. Pop. 40,000.

Arethu'sa, in Greek mythology, a daughter of Nereus and Doris, a nymph changed by Artëmis into a fountain in order to free her from the pursuit of the river god Alpheus.

Arezzo (a-ret'sō), a city of central Italy, capital of a province of the same name in Tuscany. It has a cathedral, containing some fine pictures and monuments; remains of an ancient amphitheater, etc. It was one of the twelve chief Etruscan towns, and in later times fought long

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against the Florentines, to whom it had finally to succumb. It is the birthplace of Mænas, Petrarch, Pietro Aretino, Redi, and Vasari. Pop. 11,816. The province of Arezzo contains 1,276 sq. mi. and 238,744 inhabitants.

Ar'gal (Argol, or Tartar), a hard crust formed on the sides of vessels in which wine has been kept, red or white according to the color of the wine. It is an impure bitartrate of potassium, and is of considerable use among dyers as a mordant. When purified it forms cream of tartar.

Ar'gall, SAMUEL (1572-1639), one of the early English adventurers to Virginia. He planned and executed the abduction of Pocahontas, the daughter of the Indian chief Powhattan, in order to secure the ransom of English prisoners. He was deputy-governor of Virginia (1617-1619), and was accused of many acts of rapacity and tyranny.

Ar'gand Lamp, a lamp named after its inventor, Aimé Argand (1755-1803), a Swiss chemist and physician, the distinctive feature of which is a burner forming a ring or hollow cylinder covered by a chimney, so that the flame receives a current of air both on the inside and on the outside.

Argaum (ar-gá'um), a village of India, in Berar, celebrated for the victory of General Wellesley (Duke of Wellington) over the Mahrattas under Scindia and the Rajah of Berar, Nov. 29, 1803.

Ar'glander, FREIDRICH WILHELM AUGUST (1799-1875), eminent German astronomer, director successively of the observatories of Abo and of Helsingfors; appointed professor of astronomy at Bonn, 1837, where he superintended the erection of a new observatory, catalogued over 320,000 stars, and produced several important astronomical works.

Argensola (ar-hen-sō'lá), LUPERCIO and BARTOLOME LEONARDO DE, brothers, the "Horaces of Spain," b. at Barbastro, in Aragon, the former in 1565, d. in 1613; the latter b. 1566, d. in 1631. Lupercio produced tragedies and lyric poems; Bartolomé a number of poems and a history of the conquest of the Moluccas. Their writings are singularly alike in character, and are reckoned among the Spanish classics.

Ar'gentine Republic, formerly called the United Provinces of La Plata, a vast country of South America, the total area comprising 1,125,086 sq. mi. It comprises four great natural divisions: (1) the Andine region, containing the provinces of Mendoza, San Juan, Rioja, Catamarca, Tucuman, Salta, and Jujuy; (2) the Pampas, containing the provinces of Santiago, Santa Fé, Cordova, San Luis, and Buenos Ayres; with the territories Formosa, Pampa, and Chaco; (3) the Argentine Mesopotamia, between the rivers Paraná and Uruguay, containing the provinces of Entre Rios and Corrientes, and the territory Misiones; (4) Patagonia, including the eastern half of Terra del Fuego. With the exception of the n. w., where lateral branches of the Andes run into the plain for 150 or 200 mi., and the province of Entre Rios, which is hilly, the character-

Argentine Republic

istic feature of the country is the great monotonous and level plains called "pampas." In the north these plains are partly forest-covered, but all the central and southern parts present vast treeless tracts, which afford pasture to immense herds of horses, oxen, sheep, and are varied in some places by brackish swamps, in others by salt steppes. The great water-course of the country is the Paraná, having a length of fully 2,000 miles from its source in the mountains of Goyaz, Brazil, to its junction with the Uruguay, where begins the estuary of La Plata. The Paraná is formed by the union of the Upper Paraná and Paraguay rivers, near the n. e. corner of the state. Important tributaries are the Pilcomayo, the Vermejo, and the Salado. The Paraná, Paraguay, and Uruguay are valuable for internal navigation. Many of the streams which tend eastward terminate in marshes and salt lakes, some of which are rather extensive. Not connected with the La Plata system are the Colorado and the Rio Negro, the latter formerly the southern boundary of the state, separating it from Patagonia. The source of the Negro is Lake Nahuel Huapi, in Patagonia (area 1,200 sq. mi.), in the midst of magnificent scenery. The level portions of the country are mostly of tertiary formation, and the river and coast regions consist mainly of alluvial soil of great fertility. In the pampas clay have been found the fossil remains of extinct mammalia, some of them of colossal size.

European grains and fruits, including the vine, have been successfully introduced, and are cultivated to some extent in most parts of the republic, but the great wealth of the state lies in its countless herds of cattle and horses and flocks of sheep, which are pastured on the pampas, and which multiply there very rapidly. Gold, silver, nickel, copper, tin, lead, and iron, besides marble, jasper, precious stones, and bitumen, are found in the mountainous districts of the n. w., while petroleum wells have been discovered on the Rio Vermejo; but the development of this mineral wealth has hitherto been greatly retarded by the want of proper means of transport. As a whole there are not extensive forests in the state except in the region of the Gran Chaco (which extends also into Bolivia), where there is known to be 60,000 sq. mi. of timber. Thousands of square miles are covered with thistles, which grow to a great height in their season. Cacti also form great thickets. Peach and apple trees are abundant in some districts. The native fauna includes the puma, the jaguar, the tapir, the llama, the alpaca, the vicuña, armadillos, the rhea or nandu, a species of ostrich, etc. The climate is agreeable and healthy, 97° being about the highest temperature experienced. Rain is less frequent than in the United Kingdom.

As a whole this vast country is very thinly inhabited, some parts of it as yet being very little known. The native Indians were never very numerous, and have given little trouble to the European settlers. Tribes of them, yet

Argonauts

in the savage state, still inhabit the less known districts, and live by hunting and fishing. Some of the Gran Chaco tribes are said to be very fierce, and European travelers have been killed by them. The European element is strong in the republic, more than half the population being Europeans or of pure European descent. Large numbers of immigrants arrive from Southern Europe, the Italians having the preponderance among those of foreign birth. The typical inhabitants of the pampas are the *Gauchos*, a race of half-breed cattle-rearers and horse-breakers; they are almost continually on horseback, galloping over the plains, collecting their herds and droves, taming wild horses, or catching and slaughtering cattle. In such occupations they acquire a marvelous dexterity in the use of the lasso and bolas. The river La Plata was discovered in 1512 by the Spanish navigator, Juan Diaz de Solis, and the La Plata territory had been brought into the possession of Spain by the end of the sixteenth century. In 1810 the territory cast off the Spanish rule, and in 1816 the independence of the United States of the Rio de la Plata was formally declared, but it was long before a settled government was established. The present constitution dates from 1853, being subsequently modified. The executive power is vested in a president—elected by the representatives of the fourteen provinces for a term of six years. A national congress of two chambers—a senate and a house of deputies—wields the legislative authority, and the republic is making rapid advances in social and political life. There are about 11,000 miles of railway constructed. The external commerce is important, the chief exports being wool, skins, and hides, live animals, mutton, tallow, bones, corn, and flax. The imports are chiefly manufactured goods. The trade is largely with Britain and France, and is increasing rapidly. Buenos Ayres is the capital of the state. Other towns are Cordova, Rosario, La Plata (a new city), Tucuman, Mendoza, and Corrientes. The population of the republic, according to the census of 1901, is 4,800,000.

Argives (ar'jivz) (or Argivi), the inhabitants of Argos; used by Homer and other ancient authors as a generic appellation for all the Greeks.

Argon, a gas forming less than one per cent of the atmosphere. It was discovered in 1894 by Lord Rayleigh and Prof. Ramsey. It resembles nitrogen very closely, but is somewhat heavier. Its most marked property is its extreme inactivity.

Ar'gonaut, a name given to a species of cuttle-fishes, popularly known as the *Paper Nautilus*, or *Paper Sailor*. This is the animal so celebrated in poetry, and which formerly used to be regarded as sailing on the surface of the sea, using its two expanded arms as sails, and the other arms as oars—a statement purely fictitious and erroneous. The expanded arms are always clasped round the shell, and the creature can move only after the fashion of other cuttle-fishes.

Argonauts

Argonauts, the fabled heroes of Greece who made the voyage in search of the golden fleece. According to tradition, long before the Trojan war Ænos was king of Thessaly; becoming tired of ruling, he conferred the crown on his brother, Pelias, on condition that he should only rule until Jason, the son of Ænos, became of age. When Jason reached the required age he demanded the crown of his uncle. Pelias seemingly complied, but suggested that Jason and his companions could gain great renown by going in search of the golden fleece, which was known to be in the distant land of Colchis, on the shores of the Euxine (Black Sea).

In accordance with the suggestion, the young heroes planned for the voyage, and the ship *Argo* was constructed for their service. Jason and his companions, among whom were Orpheus, Castor and Pollux, Hercules, and Theseus, started on their journey. After many adventures they reached Colchis and learned that the golden fleece was kept suspended from the branches of a tree and guarded by a dragon that never slept. The king planned to destroy the Greeks, but through the assistance of Medea, the king's daughter, and also a powerful sorceress, a deep sleep was caused to fall upon the dragon. Jason captured the golden fleece and departed for Thessaly, taking Medea, whom he married, with him. This is the most ancient voyage of discovery mentioned by the classic poets or historians.

Argo-Navis, the southern constellation of the Ship, containing 9 clusters, 3 nebulae, 13 double, and 540 single stars, of which about 64 are visible.

Argonne, a district of France between the rivers Meuse, Marne, and Aisne, celebrated for the campaign of Dumouriez against the Prussians in 1792, and for the military movements and actions which took place therein previous to the battle of Sedan, in 1870.

Argos, a town of Greece, in the northeast of the Peloponnesus, between the gulfs of Ægina and Nauplia or Argos. This town and the surrounding territory of Argolis were famous from the legendary period of Greek history onward, the territory containing, besides Argos, Mycenæ, where Agamemnon ruled, with a kind of sovereignty, over all the Peloponnesus. Argolis and Corinth now form a monarchy of the kingdom of Greece. Area 1,447 sq. mi.; pop. 136,081.

Argus, in Greek mythology, a fabulous being, said to have had a hundred eyes, placed by Juno to guard Io. Hence "argus-eyed," applied to one who is exceedingly watchful.

Argyle (or Argyll) (ar-gil'), a county in the Highlands of Scotland, consisting partly of mainland and partly of islands belonging to the Hebrides group, the chief of which are Islay, Mull, Jura, Tiree, Coll, Rum, Lismore, and Colonsay, with Iona and Staffa. Area 3,255 sq. mi., of which the islands comprise about 1,000 sq. mi. The county is mountainous. There are several lakes, the principal of which is Loch Awe. Cattle and sheep are reared in numbers, and fishing is largely carried on, as is also the making of

Aries

whisky. There is but little arable land. The chief minerals are slate, marble, limestone, and granite. County town, Inverary; others, Campbelton, Oban, and Dunoon. Pop. 75,495.

Argyle, CAMPBELLS OF, a historic Scottish family raised to the peerage in the person of Sir Duncan Campbell of Lochow, in 1445. The more eminent members are: (1) ARCHIBALD, 2d Earl, killed at the battle of Flodden, 1513.—ARCHIBALD, 5th Earl, was the means of averting a collision between the Reformers and the French troops in 1559; commanded troops at the battle of Langside; d. 1575.—ARCHIBALD, 8th Earl and Marquis, b. 1598; partisan of the covenanters; created a marquis by Charles I. It was by his persuasion that Charles II visited Scotland, and was crowned at Scone in 1651; tried for treason, and beheaded in 1661.—ARCHIBALD, 9th Earl, son of the preceding, was excluded from the general pardon by Cromwell in 1654. On the passing of the Test Act in 1681 he refused to take the required oath, was tried and sentenced to death. He escaped to Holland, was taken and conveyed to Edinburgh, where he was beheaded in 1685.—ARCHIBALD, 10th Earl and 1st Duke, son of the preceding, d. 1703; took an active part in the Revolution of 1688-89, which placed William and Mary on the throne.—JOHN, 2d Duke and Duke of Greenwich, son of the above, b. 1678, d. 1743; served at the battles of Ramillies, Oudenarde, and Malplaquet, and assisted at the sieges of Lisle and Ghent. He was long a supporter of Walpole, but his political career was full of intrigue. He is the Duke of Argyle in Scott's *Heart of Midlothian*.—GEORGE DOUGLAS CAMPBELL, 8th Duke, Baron Sundridge and Hamilton, was b. in 1823. In 1852 he became lord privy seal under Lord Aberdeen, and again under Lord Palmerston in 1859; postmaster-general in 1860; secretary for India from 1868 to 1874; again lord privy seal in 1880, but retired, being unable to agree with his colleagues on their Irish policy. He wrote the *Reign of Law, Scotland as It Was and as It Is*. Died 1900. His eldest son, the Marquis of Lorne, married the Princess Louise, fourth daughter of Queen Victoria, in 1871.

Ariadne (a-ri-ad'ne), in Greek mythology, a daughter of Minos, king of Crete. She gave Theseus a clue of thread to conduct him out of the labyrinth after his defeat of the Minotaur. Theseus abandoned her on the Isle of Naxos, where she was found by Bacchus, who married her.

Arica (á-rē'ka), a seaport of Chile, 30 mi. s. of Tacna; previous to 1882 it belonged to Peru. It has suffered frequently from earthquakes, being in 1868 almost entirely destroyed, part of it being also submerged by an earthquake wave. Pop. about 4,000.

Ariège (á-rē-āzh), a mountainous department of France, on the northern slopes of the Pyrenees, comprising the ancient counship of Foix and parts of Languedoc and Gascony. Sheep and cattle are reared; the arable land is small in quantity. Chief town, Foix. Area 1,890 sq. mi.; pop. 22,749.

Aries (ā'ri-ēz) (the Ram), a northern con-

Arion

stellation of 156 stars, of which 50 are visible. It is the first of the twelve signs in the zodiac, which the sun enters at the vernal equinox, about the 21st of March. The first point in Aries is that where the equator cuts the ecliptic in the ascending node, and from which the right ascensions of heavenly bodies are reckoned on the equator, and their longitudes upon the ecliptic. Owing to the precession of the equinoxes the sign Aries no longer corresponds with the constellation Aries, which it did 2,000 years ago.

Ari'on, an ancient Greek poet and musician, born at Methymna, in Lesbos, flourished about B. C. 625. A fragment of a hymn to Poseidon, ascribed to Arion, is extant.

Arios'to, LUDOVICO (1474-1533), one of the most celebrated poets of Italy, b. at Reggio, in Lombardy. His lyric poems in the Italian and Latin languages, distinguished for ease and elegance of style, introduced him to the notice of the Cardinal Ippolito d'Este, son of Duke Ercole I of Ferrara. He began and finished, in ten or eleven years, his immortal poem, the *Orlando Furioso*, which was published in 1515, and immediately became highly popular. At Ferrara he employed himself in the composition of his comedies, and in putting the last touches to his *Orlando*. The *Orlando Furioso* is a continuation of the *Orlando Innamorata* of Bojardo, details the chivalrous adventures of the paladins of the age of Charlemagne, and extends to forty-six cantos.

Arista, MARIANO (1802-1855), Mexican general, born in the state of San Luis Potosi, died on board the British steamer *Tagus*. He took part in the war that established Mexican independence, was a successful military leader, and in 1836 was second in command to General Santa Anna. He commanded at Palo Alto and Resaca de la Palma in the war between Mexico and the U. S. He was appointed minister of war in 1848. In 1850 General Arista became president of Mexico, which office he resigned Jan. 6, 1853. Soon afterward Arista was banished, and died in exile. In 1881 his remains were sent to Mexico.

Aristæus, in Greek mythology, son of Appollo and Cyrene, the introducer of bee-keeping.

Aristarchus (a-ris-tär'kus), an ancient Greek grammarian, b. at Samothrace B. C. 160, d. at Cyprus B. C. 88. He criticised Homer's poems with the greatest acuteness and ability. His edition of Homer furnished the basis of all subsequent ones.

Aristarchus, an ancient Greek astronomer belonging to Samos, flourished between 280 and 264 B. C., and first asserted the revolution of the earth about the sun, also regarded as the inventor of the sun-dial.

Aris'teas, a personage of ancient Greek legend, represented to have lived over many centuries, disappearing and reappearing by turns.

Aristides, surnamed "the Just" (d. 468 B. C.), a celebrated Athenian statesman and military commander. At the time of the Per-

Aristophanes

sian invasion under Darius, Aristides was one of the leaders of the Athenians. Owing to his influence and persuasion the chief command was given to Miltiades instead of changing daily among the ten generals as had been customary. To this fact was due in great measure the important victory at Marathon (490). The next year (489 B. C.) Aristides was appointed archon (chief magistrate), but his rival Themistocles managed to secure his ostracism on the pretext that he was becoming dangerous to the democracy (483). In connection with this incident is told the familiar story of Aristides's writing his own name on the shell for an illiterate citizen who wanted to vote for his ostracism, and gave as his only reason that he was tired of hearing Aristides called the Just. Such was his unselfish patriotism that during his exile he sought to unite the Grecian cities against the coming Persian invasion, and before the battle of Salamis (480) went to Themistocles and gave him his hearty support. He assisted in planning the engagement and himself took part in it. He afterward commanded the Athenian forces. When the Delian League was formed, certain states having become offended at the arrogance of Pausanias, they decided to form a confederation under the hegemony of Athens. Aristides was assigned the difficult task of adjusting the relations of the several members and assessing the expenses of the Persian war. When Themistocles was suspected, he did not join the prosecution, and after his rival's banishment always "spoke of him with admiration and respect." Aristides was so poor at his death that he was buried at public cost, but from a grateful country his children received dowries and a landed estate.

Aristip'pus, a disciple of Socrates, and founder of a philosophical school among the Greeks, which was called *Cyrenaic*, from his native town Crÿnê, in Africa; flourished 380 B. C. His moral philosophy differed widely from that of Socrates, and was a science of refined voluptuousness. His fundamental principle was, that all human sensations may be reduced to two, pleasure and pain. Pleasure is a gentle, and pain a violent emotion. All living beings seek the former and avoid the latter. Happiness is nothing but a continued pleasure, composed of separate gratifications; and as it is the object of all human exertions we should abstain from no kind of pleasure. Still we should always be governed by taste and reason in our enjoyments. His doctrines were taught only by his daughter Arêtê, and his grandson Aristippus the younger, by whom they were systematized.

Aristogeiton (gî'ton), a citizen of Athens, whose name is rendered famous by a conspiracy (514 B. C.) formed in conjunction with his friend Harmodius against the tyrants Hippias and Hipparchus, the sons of Pisistratus. Both Aristogeiton and Harmodius lost their lives through their attempts to free the country, and were reckoned martyrs of liberty.

Aristophanes (tof'a-nêz) (444-380 B. C.), the greatest comic poet of ancient Greece, born

at Athens. He appeared as a poet in B. C. 427, and having indulged in some sarcasms on the powerful demagogue Cleon, was ineffectually accused by the latter of having unlawfully assumed the title of an Athenian citizen. He afterward revenged himself on Cleon in his comedy of the *Knights*, in which he himself acted the part of Cleon. The names of his extant plays are *Acharnians*, *Knights*, *Clouds*, *Wasps*, *Peace*, *Birds*, *Lysistrata*, *Thesmophoriazusa*, *Frogs*, *Ecclesiazusa* and *Plutus*.

Aristotle (384-322 B. C.), the greatest of ancient philosophers, founder of the Peripatetic School, the last and greatest of the famous trio of Greek philosophers which included the names of Socrates and Plato. At the age of 17 Aristotle went to study at Athens, where he remained for 20 years. He was a favorite pupil of Plato, who called him "the intellect of his school." He remained a warm admirer of Plato, though opposed to his philosophical teaching. About 343 Aristotle became the teacher of Alexander the Great. After the conquest of Persia, Alexander presented him with nearly a million dollars. He also aided his scientific researches greatly by sending him a specimen of any plant or animal found on his expeditions that was unknown in Greece. This friendship led the Athenians to accuse Aristotle of favoring Macedonia, and he was forced to flee to Chalcis, on the island of Eubœa, where he died. While at Athens Aristotle taught in the Lyceum, a gymnasium near the city, by which title the school is sometimes referred to. The name "Peripatetic" is due to the fact that he walked up and down (*Gk. peripatein*) while teaching. It was his custom to instruct his more intimate pupils in the problems of philosophy during the forenoon, and in the evening he gave public lectures to the people on less weighty subjects. Only a portion of Aristotle's writings has come down to us. Of his preserved works the most important are: *Logic*, *Rhetoric*, *Poetics*, *Physics*, *Metaphysics*, *Ethics*, *Psychology*, *Politics*, *History of Animals*, *Meteorology*. He was the creator of natural science. He was the first to divide the animal kingdom into classes, and came near discovering the circulation of the blood. Aristotle's moral and political philosophy is based on the peculiarities of the human organism, and all science must be based on logic, the science of thought. To him is due the famous syllogism, the simplest form that an argument may assume. He was the first to distinguish the substance of things from their accidental characteristics; i.e. matter and form. He established the so-called "cosmological argument" for the existence of God. This is, in substance, that everything in the world has a finite cause, and back of the long succession of finite causes there must be an infinite being, a first something, absolute reason, God. One of the problems of the ancient schools of philosophy was the attainment of the highest possible happiness. This Aristotle finds to be in the intelligent use of the reasoning powers, and it is the possession of these which distinguishes

man from the beasts. Before the eleventh century Aristotle was but little known to the Christian world, although prized by the Arabians for three centuries prior to this. For four centuries he remained the authority of the Christian thinkers, but gradually his teachings became distorted and misunderstood. With the revival of learning his works were carefully studied and correctly interpreted, and their effect is felt in all subsequent philosophy, notably in Bacon, Kant, Spinoza, and Descartes.

Arith'metic, is primarily the science of numbers. As opposed to algebra it is the practical part of the science. Although the processes of arithmetical operations are often highly complicated, they all resolve themselves into the repetition of four primary operations—addition, subtraction, multiplication, and division. Of these the two latter are only complex forms of the two former, and subtraction again is merely a reversal of the process of addition. Little or nothing is known as to the origin and invention of arithmetic. Some elementary conception of it is in all probability coeval with the first dawn of human intelligence. In consequence of their rude methods of numeration, the science made but small advance among the ancient Egyptians, Greeks, and Romans, and it was not until the introduction of the decimal scale of notation and the Arabic or rather Indian, numerals into Europe that any great progress can be traced. In this scale of notation every number is expressed by means of the ten digits—1, 2, 3, 4, 5, 6, 7, 8, 9, 0, by giving each digit a local as well as its proper or natural value. The value of every digit increases in a tenfold proportion from the right toward the left; the distance of any figure from the right indicating the power of 10, and the digit itself the number of those powers intended to be expressed; thus, $3464 = 3000 + 400 + 60 + 4 = 3 \times 10^3 + 4 \times 10^2 + 6 \times 10 + 4$. The earliest arithmetical signs appear to have been hieroglyphical, but the Egyptian hieroglyphics were too diffuse to be of any arithmetical value. The units were successive strokes to the number required, the ten an open circle, the hundred a curled palm-leaf, the thousand a lotus flower, ten thousand a bent finger. The letters of the alphabet afforded a convenient mode of representing figures, and were used accordingly by the Chaldeans, Hebrews, and Greeks. The first nine letters of the Hebrew alphabet represented the units; the second nine, tens; the remaining four, together with five repeated with additional marks, hundreds; the same succession of letters with added points was repeated for thousands, tens of thousands, and hundreds of thousands. The Greeks followed the same system up to tens of thousands. They wrote the different classes of numbers in succession as we do, and they transferred operations performed on units to numbers in higher places; but the use of different signs for the different ranks clearly shows a want of full perception of the value of place as such. They adopted the letter M as

a sign for 10,000 and by combining this mark with their other numerals they could note numbers as high as 100,000,000. The Roman numerals which are still used in marking dates or numbering chapters were almost useless for purposes of computation. From one to four were represented by vertical strokes I, II, III, IIII, five by V, ten by X, fifty by L, one hundred by C, five hundred by D, a thousand by M. These signs were derived from each other according to particular rules, thus, V was the half of X; L was likewise the half of C; M was artistically written M, and D became five hundred. CCI represented 5,000. They were also compounded by addition and subtraction; thus, IV stood for four, VI for six, XXX for thirty, XL for forty, LX for sixty. Arithmetic is divided into *abstract* and *practical*; the former comprehends notation, numeration, addition, subtraction, multiplication, and division, measures and multiples, fractions, powers and roots; the latter treats of the combinations and practical applications of these and the so-called *rules*, such as reduction, compound addition, subtraction, multiplication, and division, proportion, interest, profit and loss, etc. Another division is *integral* and *fractional* arithmetic, the former treating of integers, or whole numbers, and the latter of fractions. Decimal fractions were invented in the sixteenth century, and logarithms, embodying the last great advance in the science, in the seventeenth century.

Arizona (ar-i-zō'na), a territory in the southwestern part of the United States. Bounded on the n. by Utah, on the e. by New Mexico, on the s. by Mexico, and on the w. by California and Nevada. The length and breadth are about 350 miles respectively; area, 113,020 sq. m.; population, 1900, 122,212, of which 26,400 are Indians.

The surface consists of an elevated tableland intersected by mountains and interspersed by valleys. The southwestern portion of the territory has a low altitude while the northeastern is a high plateau. Most of the streams flow through canons, some of which, like the Grand Canon of the Colorado (see *Colorado River*), are more than a mile in depth. The climate in the northern and elevated sections is temperate, while in the south it is semi-tropical. The rainfall is very light and insufficient for agriculture. The atmosphere is dry and the climate is remarkably healthful.

Mining.—Mining is the leading industry of the territory, and it has continued to increase in importance during the last decade. Copper is the leading mineral product, and the territory now produces one-fifth of the entire output of the United States and ranks next to Montana and Michigan as a copper producing region. The value of the output for 1900 was estimated at \$17,286,517. There are also several gold and silver mines in operation, and the annual production of each of these metals averages about \$2,250,000. In Navajo county there is an extensive forest of silicified wood, the specimens of which are valuable for ornamental purposes.

Agriculture.—The arid climate renders agriculture impracticable, except in regions where irrigation can be practiced. Stock raising is an important industry well suited to the locality, and affords good returns. The best irrigated districts are in the basins of the Gila and the Salt rivers and around Phoenix. In most localities the soil is fertile and only needs water to enable it to produce abundant crops. Alfalfa, wheat, barley and fruits are raised with profit in the irrigated districts, and it is expected that the recent law will enable the inhabitants to extend irrigation over a much larger section. See *Irrigation*.

Manufactures.—The location and climatic conditions have made Arizona essentially a mining and agricultural territory. Manufactures are few and are confined almost wholly to the building trades and the construction and repair of railway rolling stock. In 1900 the total value of manufactures was \$21,357,353.

Transportation.—The Southern Pacific crosses the southern part of the territory and the Santa Fe system the northern part. These systems are connected by the Santa Fe, Phoenix & Prescott line, and with their cross lines constitute the railway system of the territory. Cross lines are being extended and new lines constructed as fast as the development of industries will warrant and all the important towns now have railroad connections. The Colorado is navigable for a short distance.

Education.—The territory maintains an excellent system of public schools, and also sustains Normal schools at Flagstaff and Tempe, and the University of Arizona at Tucson. The United States government maintains several industrial schools for the Indians. The asylum for the insane is at Phoenix and the prison at Yuma.

History.—Arizona was first visited by the Spaniards in 1539. Long before this section of America was known to white men it was inhabited by a powerful race somewhat resembling the Aztecs, whose ruins of cities and fortifications still remain. What is now Arizona was very sparsely settled before the beginning of the nineteenth century. The hostility of the Apaches and other tribes retarded settlement, and outbreaks in 1802 and 1827 added to the disorder attending the Mexican Revolution, led to the abandonment of the mines and ranches and of all settlements except Tucson and Tubac. Arizona became a possession of the United States at the close of the Mexican war in 1848 as a part of New Mexico. The southern portion was added by the Gadsden Purchase in 1853, and it became an independent territory in 1863. Indian troubles broke out as late as 1896 and hindered in some degree the development of the country. The territory is now in a prosperous condition and is seeking admission to the Union. Principal towns: Phoenix, the capital, population 1900, 5,544; Tucson, 7,531; Prescott, 3,550.

Ark, the name applied in our translation of the Bible to the boat or floating edifice in which Noah resided during the flood or del-

Arkansas

uge; to the floating vessel of bulrushes in which the infant Moses was laid; and to the chest in which the tables of the law were preserved—the *ark of the covenant*.

Arkansas (ăr'kan-saw'), the *Bear State*, in the south central part of the United States; bounded on the n. by Missouri, on the e. by Missouri, Tennessee and Mississippi, from which it is separated by the Mississippi river; on the s. by Louisiana, and on the w. by Indian Territory. From n. to s. the length is about 240 miles and the average width is 225 miles. The area is 53,850 sq. m. In 1900 the population was 1,311,564, of which 366,984 were colored.

Surface.—The eastern part of the state, bordering on the Mississippi, is low and swampy and is frequently overflowed. The surface rises to the westward; in the central portion are undulating prairies and beyond these in the west and northwest the highest altitude is reached in the region of the three principal ranges, the Ozark Mountains, the Black Hills, and the Onachita Hills. A system of waterways and drainage is furnished by tributaries of the Mississippi. Chief of these is the Arkansas, which crosses the state in a southeasterly course. The other principal streams are the St. Francis in the northeast, the Big Black in the north, the White in the east, and the Saline, Onachita and Red rivers in the south. Hot and mineral springs are plentiful in Arkansas and, notably those at Hot Springs, one of the chief cities, have become resorts for patients suffering from rheumatism and similar diseases.

Climate.—Except for the debilitating heat in the eastern lowlands and the prevalence of fevers in the swampy regions, Arkansas has a healthful and agreeable climate. The mean summer temperature is about 80 degrees and the winters are mild with but little snow-fall.

Mining.—In western Arkansas is a coal area from which bituminous coal of good quality and in considerable quantities is mined. The value of the output for 1900 was \$1,687,000. In the central counties are extensive quarries which yield novaculite, honestone from which razor-hones of the best quality are made. Marble, and manganese and iron ores are abundant.

Agriculture.—The rich alluvial lowlands along the eastern border and the river valleys of the south yield annually an immense amount of cotton, which is the most important crop. Extensive cane-brakes are also found in the lowlands. The upland and hilly regions produce abundant crops of Indian corn, wheat and oats. In the western highlands, many varieties of fruit, particularly apples, peaches, apricots, grapes and berries of fine quality are profitably raised. More than three-fourths of the state is wooded. The characteristic trees of the northern portion are oak, cedar, walnut, ash and hickory. Along the lakes and bayous in the east are dense forests of cypress, and about one-fourth of the area of the state, largely in the south, is

Arkansas

covered with forests of yellow pine. Stock is raised in the highland districts which are not sufficiently fertile for cultivation.

Manufactures.—Because of the vast extent of forests, the manufacture of lumber and timber products far outranks all other industries in importance, the value of its products for 1900 being over half that of the total value of manufactured products for the state. Flouring and grist milling is of second importance; its products in 1900 were valued at \$3,708,709. Not much less in value were the products of the manufacture of cottonseed oil and oil cake. Statistics indicate that although Arkansas is still chiefly an agricultural state and exports a large amount of raw products, the manufacturing industries are making steady progress. The chief railways are the Missouri Pacific, the St. Louis & San Francisco and the St. Louis & Southwestern.

Education.—The University of Arkansas at Fayetteville and the Branch Normal College at Pine Bluff are the chief educational institutions maintained by the state. There are, besides, about fifteen important denominational colleges, private normal and high schools and several academies and private high schools for colored people. The public school system is almost wholly dependent upon local conditions. At Little Rock is the state institution for the blind, another for deaf mutes, and the state penitentiary.

History.—The state takes its name from that of an Indian tribe found by the first explorers. The first settlement was made by the French at Arkansas Post in 1685. Arkansas came into the possession of the United States with the purchase of Louisiana in 1803. It remained a part of the Territory of Louisiana until 1812, when it became a part of the Territory of Missouri. In 1819 it was organized into an independent territory, including Indian Territory. It became a state in 1836. At the breaking out of the Civil War Arkansas was about equally divided between Unionists and Secessionists, but on the call for troops by President Lincoln in 1861, an ordinance of secession was passed. The state was re-admitted in 1868. The present constitution was adopted in 1874. The principal cities are Little Rock, the capital, population in 1900, 38,307; Fort Smith, 11,587; Pine Bluff, 11,496; Hot Springs, 9,973, and Helena, 5,550.

Arkansas City, Cowley co., Kan., on Arkansas and Walnut rivers. Railroads: Santa Fé; Missouri Pacific; St. L. & S. F.; and Northwestern. Industries: railroad shops, three flouring mills, two iron foundries, chair, mattress, and other factories. There is some natural gas in the vicinity, not extensively developed. Arkansas City has been for many years the outfitting point for the various reservations in Oklahoma and Indian Territory. The town was first settled in 1869 by the Norton Colony and became a city in 1870. Pop. 1900, 6,140.

Arkansas, a river of the U. S., which gives its name to the above state, the largest affluent of the Mississippi after the Missouri. It

Arkwright

risers in the Rocky Mountains, about lat. 39° n. lon. 107° w., flows in a general southeasterly direction through Colorado, Kansas, the Indian Territory, and falls into the Mississippi. Length 2,170 mi.

Ark'wright, RICHARD (1732-1792), famous for his inventions in cotton-spinning, was born at Preston, in Lancashire. The youngest of thirteen children, he was bred to the trade of a barber. When about thirty-five years of age he gave himself up exclusively to the subject of inventions for spinning cotton. The thread spun by Hargreaves's jenny could not be used except as weft, being destitute of the firmness or hardness required in the longitudinal threads or warp. But Arkwright supplied this deficiency by the invention of the *spinning-frame*, which spins a vast number of threads of any degree of fineness and hardness, leaving the operator merely to feed the machine with cotton and to join the threads when they happen to break. His invention introduced the system of spinning by rollers, the carding, or *roving*, as it is technically termed (that is, the soft, loose strip of cotton), passing through one pair of rollers, and being received by a second pair, which are made to revolve with (as the case may be) three, four, or five times the velocity of the first pair. By this contrivance the roving is drawn out into a thread of the desired degree of tenuity and hardness. His inventions being brought into a pretty advanced state, Arkwright removed to Nottingham in 1768 in order to avoid the attacks of the same lawless rabble that had driven Hargreaves out of Lancashire. Here his operations were at first greatly fettered by a want of capital; but two gentlemen of means having entered into partnership with him, the necessary funds were obtained, and Arkwright erected his first mill, which was driven by horses, at Nottingham, and took out a patent for spinning by rollers in 1769. As the mode of working the machinery by horse-power was found too expensive he built a second factory on a much larger scale at Cromford, in Derbyshire, in 1771, the machinery of which was turned by a water-wheel. Having made several additional discoveries and improvements in the processes of carding, roving, and spinning, he took out a fresh patent for the whole in 1775, and thus completed a series of the most ingenious and complicated machinery. Notwithstanding a series of lawsuits in defense of his patent rights, and the destruction of his property by mobs, he amassed a large fortune. He was knighted by George III in 1786.

Arle (arl), a town of southern France, dep. Bouches du Rhône, 17 mi. s.e. of Nîmes. It was an important town at the time of Caesar's invasion, and under the later emperors it became one of the most flourishing towns on the further side of the Alps. It still possesses numerous ancient remains, of which the most conspicuous are those of a Roman amphitheater, which accommodated 24,000 spectators. It has a considerable trade, manufactures of silk, etc., and furnishes a market for the surrounding country. Pop. 13,291.

Armadillo

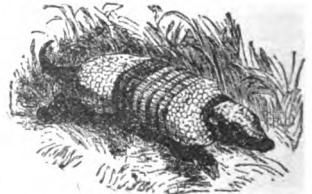
Arlington, Alexandria co., Va., a few miles from Washington city, on the opposite bank of the Potomac. Close by lies the famous "Arlington Heights," the country-seat of Gen. R. E. Lee, which was confiscated by the government after the war, but was restored to his family subsequently. Pop. 3,200.

Arlington, Middlesex co., Mass., 6 mi. from Boston, seat of Mount Hope Hospital for the Insane. It has several small factories and a savings bank. Pop. 8,603.

Arm, the upper limb in man, connected with the thorax or chest by means of the scapula or shoulder-blade, and the clavicle or collar-bone. See *Anatomy*.

Arma'da, the Spanish name for any large naval force; usually applied to the Spanish fleet vaingloriously designated the *Invincible Armada*, intended to act against England A. D. 1588. It was under the command of the Duke of Medina-Sidonia, and consisted of 130 great war vessels, larger and stronger than any belonging to the English fleet, with 30 smaller ships of war, and carried 19,925 marines, 8,460 sailors, 2,088 slaves, and 2,630 cannons. It had scarcely quitted Lisbon on May 29, 1588, when it was shattered by a storm, and had to be refitted in Corunna. It was to co-operate with a land force collected in Flanders under the Prince of Parma, and to unite with this it proceeded through the English Channel toward Calais. In its progress it was attacked by the English fleet under Lord Howard, who, with his lieutenants Drake, Hawkins and Frobisher, endeavored by dexterous seamanship and the discharge of well directed volleys of shot to destroy or capture the vessels of the enemy. The great lumbering Spanish vessels suffered severely from their smaller opponents, which most of their shot missed. Arrived at length off Dunkirk, the armada was becalmed, thrown into confusion by fire-ships, and many of the Spanish vessels destroyed or taken. The Duke of Medina-Sidona, owing to the severe losses, at last resolved to abandon the enterprise, and conceived the idea of reconveying his fleet to Spain by a voyage round the north of Great Britain; but storm after storm assailed his ships, scattering them in all directions and sinking many. Some went down on the cliffs of Norway, others in the open sea, others on the Scottish coast. About thirty vessels reached the Atlantic Ocean, and of these several were driven on the coast of Ireland and wrecked. In all, seventy-two large vessels and over 10,000 men were lost.

Armadil'lo, a toothless mammal, peculiar to South America, consisting of various species, belonging to a family intermediate between the sloths and ant-eaters.



Armadillo.

They are covered with a hard, bony shell,

Armagh

divided into belts, composed of small separate plates like a coat of mail, flexible everywhere except on the forehead, shoulders, and haunches, where it is not movable. The belts are connected by a membrane, which enables the animal to roll itself up like a hedgehog. These animals burrow in the earth, where they lie during the daytime, seldom going abroad except at night. They are of different sizes; the largest being 3 feet in length without the tail, and the smallest only 10 inches. They subsist chiefly on fruits and roots, sometimes on insects and flesh. They are inoffensive, and their flesh is esteemed good food.

Armagh (ar-mä'), a county of Ireland, in the province of Ulster. Area 328,086 acres, of which about half is under tillage. The manufacture of linen is carried on very extensively. Armagh, Lurgan, and Portadown are the chief towns. Pop. 143,056.—The county town, ARMAGH, formerly a Parliamentary borough, is situated partly on a hill, about half a mile from the Callan. It has a Protestant cathedral crowning the hill, a Gothic building dating from the eighth century, repaired and beautified recently; a new Roman Catholic cathedral in the pointed Gothic style, and various public buildings. It is the see of an archbishop of the Protestant Episcopal Church, who is primate of all Ireland, and is a place of great antiquity. Pop. 1891, 8,303.

Armagnac (ar-ma-nyak), an ancient territory of France, in the province of Gascony, some of the counts of which hold prominent places in the history of France.

Ar'mature, a term applied to the piece of soft iron which is placed across the poles of permanent or electro-magnets for the purpose of receiving and concentrating the attractive force. In the case of permanent magnets it is also important for preserving their magnetism when not in use, and hence is sometimes termed the *keeper*. It produces this effect in virtue of the well-known law of induction, by which the armature, when placed near or across the poles of the magnet, is itself converted into a temporary magnet with reversed poles, and these, reacting upon the permanent magnet, keep its particles in a state of constant magnetic tension, or in other words, in that constrained position which is supposed to constitute magnetism. A horseshoe magnet should therefore never be laid aside without its armature; and in the case of straight-bar magnets two should be placed parallel to each other, with their poles reversed, and a keeper or armature across them at both ends. The term is also applied to the core and coil of the electro-magnet, which revolves before the poles of the permanent magnet in the magneto-electric machine.

Arme'nia, a mountainous country of western Asia, not now politically existing, but of great historical interest, as the original seat of one of the oldest civilized peoples in the world. It is now shared between Turkey, Persia, and Russia. It has an area of about 137,000 sq. mi., and is intersected by the Euphrates, which divides it into the ancient divisions, Armenia Major

Armenia

and Armenia Minor. The country is an elevated plateau, inclosed on several sides by the ranges of Taurus and Anti-Taurus, and partly occupied by other mountains, the loftiest of which is Ararat. Several important rivers take their rise in Armenia; namely, the Kur or Cyrus, and its tributary; the Aras or Araxes, flowing east to the Caspian Sea; the Halys, or Kizil-Irmak, flowing north to the Black Sea; and the Tigris and Euphrates, which flow into the Persian Gulf. The principal lakes are Van and Urumiyah. The climate is rather severe. The soil is on the whole productive, though in many places it would be quite barren were it not for the great care taken to irrigate it. Wheat, barley, tobacco, hemp, grapes, and cotton are raised; and in some of the valleys apricots, peaches, mulberries, and walnuts are grown. The inhabitants are chiefly of the genuine Armenian stock, a branch of the Aryan or Indo-European race; but besides them, in consequence of the repeated subjugation of the country, various other races have obtained a footing. The total number of Armenians is estimated at 2,000,000, of whom probably one-half are in Armenia. The remainder, like the Jews, are scattered over various countries, and being strongly addicted to commerce, play an important part as merchants. They retain, however, in their different colonies their distinct nationality. Little is known of the early history of Armenia, but it was a separate state as early as the eighth century B. C., when it became subject to Assyria, as it did subsequently to the Medes and the Persians. It was conquered by Alexander the Great in 325 B. C., but regained its independence about 190 B. C. Its king Tigranes, son-in-law of the celebrated Mithridates, was defeated by the Romans under Lucullus and Pompey about 69-66 B. C., but was left on the throne. Since then its fortunes have been various under the Romans, Parthians, Byzantine emperors, Persians, Saracens, Turks, etc.

The country is now divided between Persia, Russia, and Turkey. That portion under Turkish rule has been in recent years the scene of numerous outrages, in which many native Armenians have lost their lives and property at the hands of the Kurds, who belong to the army of the Sultan. While European nations have expressed to the Porte their disapproval of these massacres, they have not taken active measures to prevent them in the future. Since 1899 persecutions have become less frequent, but the Armenians are still subject to occasional attacks, and their condition is one of continual unrest.

The Armenians received Christianity as early as the second century. During the Monophysitic disputes they held with those who rejected the twofold nature of Christ, and being dissatisfied with the decisions of the Council of Chalcedon (451) they separated from the Greek Church in 536. The popes have at different times attempted to gain them

Armentières

over to the Roman Catholic faith, but have not been able to unite them permanently and generally with the Roman Church. There are, however, small numbers here and there of United Armenians, who acknowledge the spiritual supremacy of the pope, agree in their doctrines with the Catholics, but retain their peculiar ceremonies and discipline. But the far greater part are yet Monophysites, and have remained faithful to their old religion and worship. Their doctrine differs from the orthodox chiefly in their admitting only one nature in Christ, and believing the Holy Spirit to proceed from the Father alone. Their sacraments are seven in number. They adore saints and their images, but do not believe in purgatory. Their hierarchy differs little from that of the Greeks. The *Catholicus*, or head of the church, has his seat at Etchmiadzin, a monastery near Erivan, the capital of Russian Armenia, on Mount Ararat. Turkish Armenia has been the scene of repeated massacres and outrages on Christians, evoking the indignation of the civilized world.

The Armenian language belongs to the Indo-European family of languages, and is most closely connected with the Iranic group. The Old Armenian or Haikan language, which is still the literary and ecclesiastical language, is distinguished from the new Armenian, the ordinary spoken language, which contains a large intermixture of Persian and Turkish elements. The most flourishing period of Armenian literature extended from the fourth to the fourteenth century. It then declined, but a revival began in the seventeenth century, and at the present day wherever any extensive community of Armenians have settled they have set up a printing-press. The Armenian Bible, translated from the Septuagint by Isaac or Sahak, the patriarch, early in the fifth century, is a model of the classic style.

Armentières (är-män-tyär), a town in France, dep. Nord, 10 mi. w. n. w. of Lille, on the Lys. The town has extensive manufactures of linen and cotton goods and an extensive trade. Pop. 26,614.

Armida (är-mē'-dā), a beautiful enchantress in Tasso's *Jerusalem Delivered*, who succeeds in bringing the hero, Rinaldo, with whom she had fallen violently in love, to her enchanted gardens. Here he completely forgets the high task to which he had devoted himself, until messengers from the Christian host, having arrived at the island, Rinaldo escapes with them by means of a powerful talisman. In the sequel Armida becomes a Christian.

Armin'ius, an ancient German hero celebrated by his fellow-countrymen as their deliverer from the Roman yoke; b. about 18-16 B. C., assassinated A. D. 19. He served in the Roman army, and was raised to the rank of *eques*. Returning home he found the Roman governor, Quintilius Varus, making efforts to Romanize the German tribes near the Rhine. He completely annihilated the army of Varus, consisting of three legions, in a three days' battle fought in the Teutoburg forest. After many years' resistance to the power of the em-

Arms

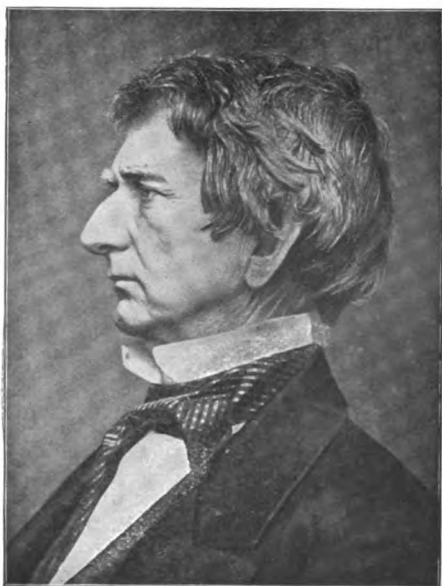
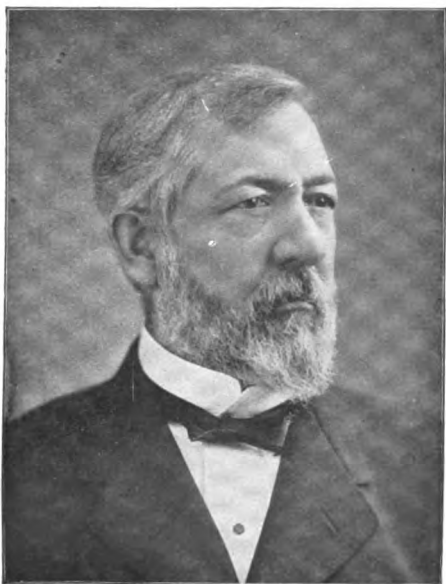
pire he drew upon himself the hatred of his countrymen by aiming at the regal authority, and was assassinated.

Armistice, a mutual agreement to suspend hostilities between two armies or nations at war. It is generally proposed when an endeavor to form a treaty of peace is being made, and sometimes when both parties are exhausted. The desire of an armistice for a temporary purpose—such as to bury the dead after the battle—is indicated by the hoisting of a white flag.

Armor'ica ("upon the sea"), a name anciently applied to all northwestern Gaul, latterly limited to what is now Brittany. Hence *Armorica* is one name for Breton or the language of the inhabitants of Brittany, a Celtic dialect closely allied to Welsh.

Armour, PHILIP D. (1832-1901), the head and one of the founders of the firm of Armour & Co., the largest pork-packing and dressed-meat establishment in the world; born at Stockbridge, N. Y., May 16, 1832; went to California in 1852; engaged in the wholesale grocery business in Milwaukee, Wis., in 1856; and in 1863 joined his brother, Herman O., in the pork-packing business. He founded in Chicago the Armour Mission, Armour Flats, and Armour Institute.

Arms and Armor.—The former term is applied to weapons of offense, the latter to the various articles of defensive covering used in war and military exercises, especially before the introduction of gunpowder. Weapons of offense are divisible into two distinct sections—firearms, and arms used without gunpowder or other explosive substance. The first arms of offense would probably be wooden clubs; then would follow wooden weapons made more deadly by means of stone or bone, stone axes, slings, bows, and arrows with heads of flint or bone, and afterward various weapons of bronze. Subsequently a variety of arms of iron and steel were introduced, which comprised the sword, javelin, pike, spear or lance, dagger, axe, mace, chariot scythe, etc.; with a rude artillery consisting of catapults, ballistæ, and battering-rams. From the descriptions of Homer we know that almost all the Grecian armor, defensive and offensive, in his time was of bronze; though iron was sometimes used. The lance, spear, and javelin were the principal weapons of this age among the Greeks. The bow is not often mentioned. Among ancient nations the Egyptians seem to have been most accustomed to the use of the bow, which was the principal weapon of the Egyptian infantry. Peculiar to the Egyptians was a defensive weapon intended to catch and break the sword of the enemy. With the Assyrians the bow was a favorite weapon; but with them lances, spears, and javelins were in more common use than with the Egyptians. Most of the large engines of war—chariots with scythes projecting at each side from the axle, catapults, and ballistæ—seem to have been of Assyrian origin. During the historical age of Greece the characteristic weapon was a heavy spear from 21 to 24 feet in length.



STATESMEN

James G. Blaine
William H. Seward

Thomas B. Reed
Charles Sumner

Arms

The sword used by the Greeks was short, and was worn on the right side. The Roman sword was from 22 to 24 inches in length, straight, two-edged, and obtusely pointed, and as by the Greeks was worn on the right side. It was used principally as a stabbing weapon. It was originally of bronze. The most characteristic weapon of the Roman legionary soldier, however, was the *pilum*, which was a kind of pike



1, 2, Early Greek. 3, Greek. 4, 5, Roman. 6, Barbarian.

or javelin, 6 feet or more in length. The *pilum* was sometimes used at close quarters, but more commonly it was thrown. The favorite weapons of the ancient Germanic races were the battle-axe, the lance or dart, and sword. The weapons of the Anglo-Saxons were spears, axes, swords, knives, and maces or clubs. The Normans had similar weapons, and were well furnished with archers and cavalry. The cross-bow was a comparatively late invention introduced by the Normans. Gunpowder was not used in Europe to discharge projectiles till the beginning of the fourteenth century. Cannon are first mentioned in England in 1338, and there seems to be no doubt that they were used by the English at the siege of Cambrai in 1339. The projectiles first used for cannon were of stone. Hand firearms date from the fifteenth century. At first they required two men to serve them, and it was necessary to rest the muzzle on a stand in aiming and firing. The first improvement was the invention of the match-lock, about 1476; this was followed by the wheel-lock, and about the middle of the seventeenth century by the flint-lock, which was in universal use until it was superseded by the percussion-lock, the invention of a Scotch clergyman early in the nineteenth century. The needle-gun dates from 1827. The only important weapon not a firearm that has been invented since the introduction of gunpowder is the bayonet, which is believed to

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have been invented about 1650. See *Cannon, Musket, Rifle*, etc.

Some kind of defensive covering was probably of almost as early invention as weapons of offense. The principal pieces of defensive armor used by the ancients were shields, helmets, cuirasses, and greaves. In the earliest ages of Greece the shield is described as of immense size, but in the time of the Peloponnesian war (about B. C. 420) it was much smaller. The Romans had two sorts of shields: the *scutum*, a large, oblong, rectangular, highly convex shield, carried by the legionaries; and the *parma*, a small, round, or oval flat shield, carried by the light-armed troops and the cavalry. In the declining days of Rome the shields became larger and more varied in form. The helmet was a characteristic piece of armor among the Assyrians, Greeks, Etruscans, and Romans. Like all other body armor it was usually made of bronze. The helmet of the historical age of Greece was distinguished by its lofty crest. The Roman helmet in the time of the early emperors fitted close to the head, and had a neck-guard and hinged cheek-pieces fastened under the chin, and a small bar across the face for a visor. Both Greeks and Romans wore cuirasses, at one time of bronze, but latterly of flexible materials. Greaves for the legs were worn by both, but among the Romans usually on one leg. The ancient Germans had large shields of plaited osier covered with leather; afterward their shields were small, bound with iron, and studded with bosses. The Anglo-Saxons had round or oval shields of wood, covered with leather, and having a boss in the center; and they had also corselets, or coats of mail, strengthened with iron rings. The Normans were well protected by mail; their shields were somewhat triangular in shape, their helmets conical. In Europe generally metal armor was used from the tenth to the eighteenth century, and at first consisted of a tunic made of iron rings firmly sewn flat upon strong cloth or leather. The rings were afterward interlinked one with another so as to form a garment of themselves, called *chain-mail*. Great variety is found in the pattern of the armor, and in some cases small pieces of metal were used instead of rings, forming what is called *scale-armor*. A suit of armor consisting of larger pieces of metal, called *plate-armor*, was now introduced, and the whole body came to be incased in a heavy metal covering. The various forms of ring or scale armor were gradually superseded by the plate-armor, which continued to be worn until long after the introduction of firearms and field artillery. A complete suit of armor was an elaborate and costly equipment, consisting of a number of different pieces, each with its distinctive name. In modern European armies the metal cuirass is still to some extent in use, the *cuirassiers* being heavy cavalry; and it is said that this piece of armor proves a useful defense against rifle bullets. During all the time that the use of heavy armor prevailed, the horsemen, who

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alone were fully armed, formed the principal strength of armies; and infantry were generally regarded as of hardly any account. England was, however, an exception, as the English archers were almost at all times, before the invention of gunpowder, an important and sometimes the chief force in the army. The bow (*long-bow*) of the English archers was from 5 to 6 feet in length, and the arrow discharged from it was itself a yard long. The long-bow continued in general use in England till the end of the reign of Elizabeth, and even as late as 1627 there was a body of English archers in the pay of Richelieu at the siege of La Rochelle.

Armstrong, JOHN (1758-1843), soldier, b. in Carlisle, Pa. In 1775, while a student at Princeton, he enlisted in a Pennsylvania regiment, and was appointed aide to Gen. Hugh Mercer. Afterward he became aide to General Gates, with the rank of major, serving in the campaign against Burgoyne and in the South. On March 10, 1783, an anonymous notice was circulated among the officers, urging the troops to lay down their arms, and complaining of the neglect of Congress to give proper attention to their condition. This paper is known as the "Newburg Memorial;" in later years Major Armstrong confessed that he was the author. When the army disbanded Armstrong returned to Carlisle, and soon afterward was made secretary of state, and later adjutant-general of Pennsylvania. Armstrong married a sister of Robert R. Livingston, of New York, removed to that state, and settled on a farm in the old Livingston manor, 1789. In 1800 he was elected to the U. S. Senate, and in 1804 was appointed minister to France; later he became minister to Spain. In 1810 he returned to New York. During the war of 1812 he was made brigadier-general, and in 1813 was appointed secretary of war. He resigned in September, 1814. He published a *History of the War of 1812*, and a *Review of General Wilkinson's Memoirs*.

Armstrong, WILLIAM GEORGE, engineer and mechanical inventor, born at Newcastle-on-Tyne, 1810. Among his early inventions were the hydro-electric machine, a powerful apparatus for producing frictional electricity, and the hydraulic crane. In 1846 the Elswick works, near Newcastle, were established for the manufacture of his cranes and other heavy iron machinery, and these works are now among the most extensive of their kind. Here the first rifled ordnance gun which bears his name was made in 1854. (See next article.) His improvements in the manufacture of guns and shells led to his being appointed engineer of rifled ordnance under government, and he was knighted in 1858. This appointment came to an end in 1863, since which time his ordnance has taken a prominent place in the armaments of different countries. He was raised to the peerage as Baron Armstrong in 1887.

Armstrong Gun, a kind of cannon, so-called from its inventor, made of wrought-iron, principally of spirally-coiled bars, so disposed as

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to bring the metal into the most favorable position for the strain to which it is to be exposed, and occasionally having an inner tube or core of steel, rifled with numerous shallow grooves. The size of these guns ranges from the smallest field-piece to pieces of the highest caliber. The projectile is coated with lead, and inserted into a chamber behind the bore. This the explosion drives forward, compressing its soft coating into the grooves, so as to give it a rotary motion, and at the same time obviate windage. Both breech-loading and muzzle-loading Armstrong guns are made.

Army, a body of armed men, so organized and disciplined as to act together, be mutually reliant, and perform in unison the evolutions of the march and battle-field according to the absolute will of one man. An army is a movable engine composed of a vast number of individual parts or powers, arranged so as not only to act in concert, but to exert their whole aggregate force in any direction and upon any point which may be ordered or required. The organization of an army is of two kinds,—tactical and administrative. The former enables the leader of an army to transmit his orders to three or four subordinate commanders, who pass them on to three or four others under them, until, through a regular chain of responsibility, the original impulse is communicated to the private soldier. The latter, in a similar manner, divides the army into groups of gradually decreasing size, so that the men may be efficiently paid, fed, clothed, and armed. The present article will treat only of the constitution and establishment of armies, and indicate their gradual historical development. Technical terms generally, as well as all the component elements of the army, in personnel and material, and the organization and duties of the troops, will be found noticed under their proper headings; the tactical positions of an army are defined below.

Ancient Armies.—The earliest regular military organization is attributed to Sesostris, who flourished in Egypt about sixteen centuries B.C. This extraordinary conqueror divided Egypt into thirty-six military provinces, and established a sort of militia, or warrior caste, to each member of which he allotted lands for the support of himself and his family. After him, little further progress was made in military art until the Persian Empire arose. Its soldiers introduced the mass-formation, with cavalry in intervals of squares; but the most important feature of the Persian organization was the establishment of what was practically a standing army, divided as garrisons throughout the conquered provinces, and under the control of military governors distinct from the satraps. In time of war this standing army was augmented by a general levy which included the tributary nations, and therefore resulted in a heterogeneous collection of barbarous and undisciplined peoples; a source of weakness which caused the defeat of Xerxes's numerically powerful army. In Greece, it was not a standing army, but a sort of national

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militia that gained Marathon, Platae, and Mycale. The leading men in each state paid attention to organization and tactics in a way never before seen. The Lacedæmonians invented the phalanx, a particular mass-formation for foot-soldiers; and to this the Athenians added lighter troops to cover the front and harass the enemy in march. Their cavalry also were efficient and alert. The Thebans introduced the column formation, which, being deeper and narrower than the phalanx, was intended to pierce the enemy's line at some one point and throw them into confusion. Philip, the father of Alexander the Great, established in Macedonia the world's second standing army; and, as a further change, made the phalanx deeper and more massive than it had been among the Lacedæmonians. He brought into use the Macedonian pike, a formidable weapon 24 feet in length. With a phalanx sixteen ranks in depth, six rows of men could present the points of these long pikes protruding in front of the front row, forming a bristling array of steel terrible to encounter. Meanwhile, a more western power was developing what was perhaps the most perfect organization in the annals of military history. The Romans initiated changes in army matters which have had a wide-spread influence throughout the civilized world. About the period 200 B. C., every Roman, from the age of 17 to 46, was liable to be called upon to serve as a soldier; the younger men were preferred, but all were available up to the middle time of life. They went through a very severe course of drill and discipline, to fit them alike for marching, fighting, camping, working, carrying, and other active duties. The Roman legion, in its best days, excelled all other troops alike in discipline and in *esprit*. So long as none but freemen were enlisted, the position of a legionary was one of honor; but when it became necessary to supply the armies of ambitious leaders with large drafts of slaves and criminals, the character of the body naturally fell with that of the individual. With a gradual laxity in discipline, the decline of the Roman power commenced. The undercurrent of insubordination resulted in reverses, and though discipline was revived spasmodically under great commanders, it ultimately died out.

Medieval Armies.—With the decline of the Roman power, all that remained of scientific warfare was lost for a time. The northern invaders made little use of tactics, but relied chiefly on their personal bravery, and on the impetuosity and weight of their attack in column. The army, among the Franks and Germans, was the nation. Kings and generals were intrusted in time of war with an absolute power, which the nation resumed with the return of peace. The conquerors of the Roman Empire at first recognized no superior save the community, of which all conquests were the property; individual chiefs rewarding their own followers with gifts of the lands they had helped to conquer. The growth of a feeling that such gifts could be revoked, and

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that they implied an obligation to future service, marks the beginning of the Feudal System, under which national armies disappeared, and each baron had a small army composed of his own militia or retainers, available for battle at short notice. The contests of these small armies, sometimes combined and sometimes isolated, make up the greater part of the wars of the Middle Ages. Of military tactics or strategy there was very little; the campaigns were desultory and indecisive; and the battles were gained more by individual valor than by any well-concerted plan. The Crusades effected some improvements in all these respects. The forces which went to the Holy Land were at first mere armed mobs, upheld by fanaticism, but ignorant of all discipline, and under leaders destitute alike of forethought and powers of combination. The reverses they sustained, however, showed the necessity for some organization, and the extended service called attention to and developed the value of the foot-soldiers. The invention of gunpowder effected much less change, during the Middle Ages, than is generally supposed. When men could fight at a greater distance than before, and on a system which brought mechanism to the aid of valor, everything connected with the military art underwent a revolution. The art of making good cannon and hand-guns grew up gradually, like other arts; and armies long continued to depend principally on the older weapons,—spears, darts, arrows, axes, maces, swords, and daggers. Each knight sought how he could best distinguish himself by personal valor; and sometimes it happened that the fate of a battle was allowed to depend on a combat between two knights.

Modern Armies.—The Turkish Janissary force, the earliest standing army in Europe, was fully organized in 1362; but the formation of standing armies among Western powers, which may be said to have introduced the modern military system, dates from the establishment of *compagnies d'ordonnance* by Charles VII of France, nearly a century later. These companies of men-at-arms amounted, with their attendants, to 9,000 men; and to them the king afterward added 16,000 franc-archers, largely recruited from the mercenaries which growing wealth and luxury had developed. Monarchs contracted with powerful nobles to raise, by enlistment, regiments, which were now broken up into squadrons or battalions as tactical units, the regiment remaining the administrative unit. Between the beginning of the sixteenth and the end of the eighteenth centuries, the proportion of the musketeers gradually increased; the pike was abandoned for the bayonet, and even the cavalry were taught to rely more on their fire than on the effect of their charge. The improvements in weapons naturally affected the formation. During the Thirty Years' War (1618-48) Gustavus Adolphus and Wallenstein adopted opposite modes of dealing with masses of infantry; the former spread them out to a great width, and only six ranks in depth; whereas the lat-

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ter adopted a narrower front, with a depth of twenty to thirty ranks. In Louis XIV's reign, the prolonged wars introduced the larger grouping in brigades and divisions. Frederick the Great, in the next century, reduced the depth of his infantry formation to three ranks, and introduced a most rigid and exact system of tactics and drill. He greatly improved the cavalry tactics, and restored to this arm a reliance on the effect of a rapid charge, while the introduction of horse artillery added to its power.

The French Revolution effected almost as great changes in the military as in the political organization of Europe. The struggle from which France emerged victorious in 1797 had exhausted even the enormous levies which had fed her armies for the previous five years; and in 1798 a law was passed establishing compulsory military service. Every citizen was declared liable to five years' service, and all between the ages of 20 and 25 were enrolled. The immense advantage which this terrible power gave Napoleon, compelled other nations to follow the example of France, and in Europe voluntary enlistment has since survived in England alone. In spite of the strength which Prussia mustered under Blücher, the teaching of Sadowa and the events of 1870 and 1871 were required to induce the other powers to follow her example. Now, in most nations will be found an army of reserve, intended to augment the standing army, or first fighting line, from a peace to a war strength, and consisting of two classes—those waiting for an immediate call to arms, if required, and those constituting the militia or second line of reserves—the entire effective military power of the state. The principles of organization were also modified in the large armies which took the field in the beginning of the century. In 1792, mixed divisions, composed of all arms, had been introduced, and in 1804 Napoleon organized, under his marshals, *corps d'armee*, each in itself a complete army. A smaller force taking the field consisting of one corps or less, is generally called an expeditionary force. It should perhaps be added that a *corps d'armee* takes up on the line of march from 20 to 30 miles, the actual rate of marching may be stated at from 1 to 2 miles an hour, even this rate being dependent on the state of the roads and any circumstances (such as an excessive proportion of guns) that may impede a column of march.

U. S. Army.—By the constitution of the U. S. the president is commander-in-chief of the army and navy of the Union, and Congress has power to raise and support armies, to regulate them, and to provide for executing the laws of the Union, suppress insurrections, and repel invasions. The military history of the U. S. begins with the army of Washington, and the growth has been spasmodic. In 1790, the army as fixed by act of Congress, consisted of 1,216 men. In 1861, at the commencement of the Civil War, the regular force amounted to only 14,000 men. In April of that year, President Lincoln called out 75,000 volunteers for

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three months, and in May, 42,000. In July two calls of 500,000 each were authorized by Congress, and it was found necessary to introduce conscription. In October, 1863, a levy of 300,000 was ordered, and in the following February a call for 500,000 was made. In the early part of 1865 two levies amounting in all to 500,000 were made, but were only partially carried out on account of the cessation of hostilities. Thus the total number of men in the army between April, 1861, and April, 1865, amounted to 2,759,050. The Southern states during this time raised an army of about 1,100,000 men, and thus in the whole U. S. was raised the enormous army of nearly 4,000,000 men. The army reorganization bill passed by Congress in 1901 provided for a standing army of 55,000 men as the minimum, but the President is empowered to raise it to 100,000 if necessary. The army previously was limited to 25,000 men. The U. S. is divided into the following military Departments: Department of the East, headquarters Long Island, New York harbor; Department of the Lakes, headquarters Chicago; Department of the Gulf, headquarters Atlanta, Ga.; Department of Dakota, headquarters St. Paul; Department of Missouri, headquarters Omaha; Department of Colorado, headquarters Denver; Department of Columbia, headquarters Vancouver's Barracks, Washington; Department of California, headquarters San Francisco. The Hawaiian Islands are included in the Department of California; the Island of Puerto Rico constitutes the Department of Puerto Rico, headquarters San Juan. During the time of military occupation by the United States of Cuba it constitutes a grand military division with headquarters at Havana. The Philippine Islands constitute the Department of the Pacific, with headquarters at Manila. In addition to the regular army nearly every state and territory has an organized militia force, organized and governed in each state by special statute laws. On January 1, 1898, the total organized militia in the United States comprised 9,196 officers and 105,166 men. Following are the numbers of men that have been enrolled in the various wars in which the United States have been engaged, the numbers for the Revolution being only approximate. Revolution, 337,000; 1812, 471,622; Mexican, 116,321; Civil War, Union 2,326,168, Confederate 1,100,000; Spanish, 274,717. The annual salaries are as follows: Major-general, \$7,500; brigadier-general, \$5,500; colonel, \$3,500, increased gradually to \$4,500; lieutenant colonel, \$3,000, increased by installments to \$4,000 during twenty years; major, \$2,500; captains, mounted \$2,000, unmounted \$1,800; first lieutenant, mounted \$1,600, unmounted \$1,500; second lieutenant, mounted \$1,500, unmounted \$1,400; the salaries of all officers below major are increased 40 per cent during twenty years.

The Army consists of two branches, the *line* and *staff*. The former includes officers and men doing field or garrison duty; the latter is a board, composed of experienced officers, whose duty it is to keep the line supplied with

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all things necessary for the successful prosecution of its work. The various departments, such as those of the quartermaster and inspector, were formerly separate; by a bill approved Feb. 14, 1903, these departments were abolished, also the office of commanding general, and in the latter's place is a chief of staff, who has complete direction of all movements and departments of the army, insuring at least system and co-operation among the various branches of administration. Gen. Miles, first chief under the act, was retired Aug. 8, 1903, having reached the age limit, and was succeeded by Gen. S. B. M. Young, who in turn was succeeded in January, 1904, by Gen. A. R. Chaffee. All officers of the staff must return after five years to the line, where they must serve at least two years. Closer relations have also been established by this act between the National Guard and the military department.

British Army.—According to the system of localization commenced in 1872, the United Kingdom is divided into 10 military districts, 6 of which are in England, 3 in Ireland, while Scotland makes one by itself. Aldershot, Woolwich, Chatham, and the Curragh are not included in any of these districts. In each district a general officer has command of all the forces within it, including the militia and volunteers. These districts are subdivided into 70 sub-districts called infantry brigade districts, of which 54 are in England, 8 in Scotland, and 8 in Ireland. Each brigade consists of 2 battalions of the line, a brigade depot, 2 battalions of militia, besides the reserve of the district. The terms of enlistment are either for 12 years' army service (long service), or for 7 years' army service and 5 years' reserve service (short service). After 12 years' service in the army a soldier may be permitted to re-engage for another 9 years, and after the completion of the whole period of 21 years' service is entitled to be discharged with a pension. British soldiers under the rank of a commissioned officer receive payment varying from one shilling a day, which is the pay of a private in an infantry regiment, up to 6 shillings a day, the pay of a regimental sergeant-major in the Royal Engineers. According to the regulations now in force, first commissions are given to successful candidates at the Civil Service Commissioners' open examinations; to university students or lieutenants of militia who pass certain examinations; or to non-commissioned officers specially recommended; while promotion is regulated by seniority principally, but partly by selection. The military strength of the British army in 1897 was: regular troops enrolled, home and colonial, 154,000; grand war total, 570,634.

Germany.—By the imperial constitution of 1871, the Prussian obligation to serve in the army is extended to the whole empire. Every German capable of bearing arms must serve in the army or navy for 12 years—7 in the standing army (3 with the colors, and 4 in the reserve), and 5 in the landwehr; or corresponding periods in the fleet and seeweher. Afterward he is enrolled in the landsturm

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until 42 years of age. In the infantry, however, many of the more intelligent men are subjected to only 2 years' training; and "one-year volunteers" are passed into the reserve at the end of their first year, on condition of passing certain examinations, and bearing the expense of their clothing, equipment, etc., for the year. In the German organization the territorial system is carried out thoroughly. The army consists of 18 army corps, 13 of which are Prussian; and each of these is raised, recruited, and stationed within a particular district. These corps districts are divided into divisional and brigade districts, which are subdivided into landwehr battalion districts, and these in turn into company districts, so that every village has its definite place. Each line regiment (3 battalions) draws its recruits from an allotted district, and passes its time-expired men into the landwehr regiment (2 battalions) of the same district. After the exemptions common to all countries have been granted, the ballot allows a margin of about 10 per cent.; those who draw the fortunate numbers passing at once into the Ersatz reserve, which receive no training, but may be called upon to replace casualties in the field.

France.—A law passed in 1872 enacted that every Frenchman, with a few specified exceptions, unless serving in the navy, was liable to personal service in the army, and forbade substitution. The period of liability extended to 20 years, of which 5 were spent in the active army, 4 in the reserve of the active army, 5 in the territorial army, and 6 in the reserve of the territorial army. The expense of keeping up such an establishment in peace, however, led to the division of the recruits by ballot into two classes, one of which served the full 5 years in the active army, while the other was sent home after 6 months' or a year's training. One-year volunteers were also accepted; but so many men joined in that capacity, that, in 1887, a bill was brought before the French legislature abolishing the privilege. In the same year an Army Reorganization Bill was introduced, reducing the period of service with the colors to 3 years, and proposing a large addition to the establishment; the object of the changes being to materially add to the number of efficient without increasing the military budget. By the law of 1873, France is divided, for military purposes, into 18 regions, each occupied by a *corps d'armée*, containing 2 divisions of infantry, 1 brigade of cavalry, 1 of artillery, 1 battalion of engineers, and 1 squadron of the military train, and retaining its organization permanently in peace and in war. The corps are not permanently localized, but frequently change stations; and in time of war the region in which a corps happened to be stationed would be drawn on for reserves and stores.

Austria.—The military forces of the Austro-Hungarian empire are divided into the standing army, the landwehr, and the landsturm. All subjects are liable to service, and those exempted on physical grounds pay a fine pro-

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portionate to their means. In principle every qualified man must serve three years with the colors, 4 in the reserve, 5 in the landwehr, and, by a law passed in 1886, 12 in the landsturm, from which, in time of war, men may be drafted into the landwehr; and men who have passed through the regular army will be liable for service in the landsturm as officers or non-commissioned officers till the age of sixty. In practise, however, financial considerations cause the division of recruits into three classes: about 95,000 annually form the first class, trained as above; nearly 10,000 are drawn to supply the Ersatz reserve; and all the remainder are passed at once into the landwehr, there to serve their 12 years. The regiments of the standing army are under the control of the minister of war of the empire, while the landwehr is controlled by the Austrian and Hungarian ministers of national defense. There is no permanent corps organization, the division being the principal unit; but in war, 3 infantry divisions, with a proportion of cavalry and a regiment of artillery, would be joined to form a corps.

Russia.—Universal liability to service has been established since 1870, but, although prohibited, the purchase of exemption has hitherto been permitted, at a fixed rate of 800 roubles (about \$635). The period of service is 15 years; 6 in active service (2 generally on furlough), and 9 in the reserve. The Russian military forces are composed of regular and irregular troops, and militia, only called out to repel invasions. Every man not in the army or reserve belongs to the militia up to his fortieth year. The country has been divided into 15 military districts, with sub-districts and "circles" as in Germany. The number of army corps is 17, with the army of the Caucasus (7 divisions of infantry and 1 of cavalry) in addition. The irregular troops are supplied by the Cossacks, who give military service in lieu of taxes, and comprise about 190,000 men, chiefly cavalry. The want of barrack accommodation leads to a great deal of billeting, and many men stationed in country districts see their officers only in summer, when they are assembled for training in large standing camps.

Italy.—The Sardinian law of conscription forms the basis of the Italian military system, and all are liable from eighteen to forty. Substitution is allowed in the case of brothers, and one-year volunteers are accepted. Contingents are divided by lot into two classes, one enjoying unlimited furlough, and the other serving 8 years in the army, 4 in the active militia, and the rest of their time in the local militia. In infantry regiments 3, in cavalry regiments 5 years only are served with the colors; the remainder, as a rule, being spent on furlough. The kingdom is divided into five "zones," and, in direct opposition to the Prussian principle, recruits are drawn from all zones for each regiment.

Of the other military powers of Europe, the army of Belgium, including the staff and all

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arms, rank and file, number about 50,000 men, besides the Garde Civique, 40,000; Denmark, 50,000, including the extra reserve of 14,000; Netherlands, 6,000 in Europe, and 31,000 in the East Indies; Spain, 145,000, with 40,000 in the colonies; Sweden, 40,000, besides the conscription troops, 135,000, and the militia, 16,000; in Norway the troops of the line are about 12,000 in peace, and in time of war not more than 18,000 without the consent of the Storting; Switzerland, 117,000, and the landwehr 4,000; Turkey can be raised by mobilization to 475,000.

Army Worm, the very destructive larva of a moth so called from its habit of marching in compact bodies of enormous number, devouring almost every green thing it meets. It is about $1\frac{1}{2}$ in. long, greenish in color, with black stripes, and is found in various parts of the world, but is particularly destructive in North America. The larva of a European two-winged fly is also called army worm.

Arndt (ärnt), ERNST MORITZ, German patriot and poet; b. 1769, d. 1860. He was appointed professor of history at Griefswald in 1806, and stirred up the national feeling against Napoleon in his work *Geist der Zeit* (*Spirit of the Time*). In 1812-13 he zealously promoted the war of independence by a number of pamphlets, poems, and spirited songs, among which it is sufficient to refer to his *Was ist des Deutschen Vaterland?* *Der Gott, der Eisen wachsen liess*, and *Was blasen die trompeten? Husaren heraus!* which were caught up and sung from one end of Germany to the other.

Arne (ärn), THOMAS AUGUSTINE (1710-1778), English composer. To him the British owe the national air, *Rule Britannia*, originally given in a popular piece called the *Masque of Alfred*.

Arn'hem (or Arnheim), a town in Holland, province of Gelderland, 18 mi. s.w. of Zutphen, on the right bank of the Rhine. It manufactures cabinet wares, mirrors, carriages, mathematical instruments, etc.; has paper-mills, and its trade is important. In 1795 it was stormed by the French, who were driven from it by the Prussians in 1813. Pop. 46,233.

Ar'nica, a genus of plants, consisting of some twelve species, one of which is found in Central Europe and in the Western states. It has a perennial root, a stem about two feet high, bearing on the summit flowers of a dark golden yellow. In every part of the plant there is an acrid resin and a volatile oil, and in the flowers an acrid bitter principle called *arnicin*. The root contains also a considerable quantity of tannin.



Arnica.

Arno

A tincture of it is employed as an external application to wounds and bruises.

Ar'no, a river of Italy which rises in the Etruscan Apennines, makes a sweep to the south and then trends westward, divides Florence into two parts, washes Pisa, and falls 4 mi. below it, into the Tuscan Sea, after a course of 130 mi.

Arnold, BENEDICT (1741-1801), b. in Norwich, Conn.; d. in London. He had a common school education, and went to New Haven and conducted a book and drug store. He visited Honduras, where he fought a duel with an English captain, provoked by the captain's reflections on New England. In 1767, he married Miss Margaret Mansfield. After the battle of Lexington, Arnold was sent by Massachusetts to lead an expedition for the capture of Crown Point and Ticonderoga, and on his way thither met Col. Ethan Allen with a company of soldiers devoted to the same purpose. Allen took the lead, to which he was entitled, and captured Ticonderoga on May 10, 1775. Four days later Arnold captured St. John's. In the autumn of the same year Washington dispatched Arnold with 1,100 men to assist in capturing Quebec. On December 31 he was joined by the corps of General Montgomery, and a combined attack was made. The American army was defeated, Montgomery killed, and Arnold's leg fractured. Congress promoted him to the rank of brigadier-general. On Oct. 11, 1776, he fought a naval battle with a force of the British, during which he ran his own vessel ashore, burnt her, and with his other ships retreated to Ticonderoga. In 1777, congress appointed five major-generals for the army, all of whom were juniors of Arnold. He was stung by this injustice, and Washington wrote to assure him that he would endeavor to remedy "the error." On presenting his claims for advancement in rank, Congress voted him thanks, but did not promote him. Arnold resigned, but his resignation was not accepted. At that time Washington urged Congress to send Arnold north to head off General Burgoyne. Arnold consented to serve. He joined Gen. Philip Schuyler, and led an expedition to relieve Fort Stanwix, then besieged by a force of British and Indians. He returned to the main army, and took part in the first battle of Bemis Heights, October 19, 1777. Arnold then joined General Washington, and soon after Congress sent him his commission as major-general. In June, 1778, he was appointed to the command of Philadelphia. He became involved in quarrels with the authorities of Pennsylvania. He was tried by court-martial but was acquitted of intentional wrong-doing, though in some respects his conduct was declared improper. The sentence was that he should receive a reprimand from the commander-in-chief. Washington discharged this duty with considerable reluctance, and assured him of his continued esteem and the high estimate he placed on his services. Arnold's first wife had died recently, and he married Miss

Arnold

Margaret Shippen, a daughter of Chief Justice Shippen of Pennsylvania. Through this marriage he was brought into connection with several Tory families, and a correspondence was opened with Sir Henry Clinton. In 1780 Arnold visited the camp of Washington, and was tendered the command of the left wing of the army. He declined on the pretense of inability to perform service in the field, on account of the wound received at Saratoga. Instead he desired the command at West Point, on which he entered in 1780. Arnold's treachery became manifest through the capture of Major André, and he escaped to New York City. He was compensated with a British brigadier-general's commission and a sum of money. Early in 1781, at the head of a British force, he led a raid into Virginia, and made an attack on New London. He went to London in 1782. In 1797 the British Government gave him 13,400 acres of land in Canada. All his sons received commissions in the British army. But Arnold was despised and shunned even by the British, and died in obscurity.

Arnold, EDWIN, SIR (1832-1904), a British poet, scholar, and journalist. In 1861 he joined the editorial staff of the *Daily Telegraph*, with which he was connected for many years. He is author of poems, narrative and lyrical, numerous translations from the Greek and Sanskrit; *The Light of Asia*, a poem presenting the life and teaching of Guatama, the founder of Buddhism; *Pearls of the Faith; Lotus and Jewel*; etc.

Arnold, ISAAC NEWTON (1815-1884), b. in Oswego co., N. Y., was admitted to the bar in 1835. He moved to Chicago, of which, in 1837, he became the first city clerk. In 1842-43 he was a member of the Illinois legislature, and again in 1856. He served in Congress as a Republican 1860-65. In 1867 he published *The Life of Abraham Lincoln*, and in 1880 *The Life of Benedict Arnold*. He was for several years president of the Chicago Historical Society, and published pamphlets on the early history of Illinois.

Arnold, MATTHEW (1822-1888), English critic, essayist, and poet, was b. at Laleham, near Staines, being a son of Dr. Arnold of Rugby. Arnold was for many years a British school inspector and for a time professor of poetry at Oxford. He was the author of many poems, among which one of the finest is *Sohrab and Rustum*. His prose style is clear, discriminating and unimpassioned, and his criticisms, though just, are often mercilessly cold. Most of his critical essays are contained in his *Essays on Criticism*.

Arnold, THOMAS (1795-1842), an English educator. In 1823 he was appointed head-master of Rugby School. His success was remarkable. Not only did Rugby School become crowded beyond any former precedent, but the superiority of Dr. Arnold's system became so generally recognized that it may be justly said to have done much for the general improvement of the public schools of England. In 1841 he was appointed professor of modern

Arnsberg

history at Oxford. His chief works are his edition of *Thucydides*, his *Roman History*, and his *Sermons*. Plate 27, Vol. III.

Arnsberg (árnz'berh), a town in Prussia, prov. Westphalia, capital of the government of same name, on the Ruhr. Pop. 6,733.—The government of Arnsberg has an area of 2,972 sq. mi., and a population of 1,189,688.

Arnulf, great grandson of Charlemagne, elected king of Germany A. D. 887; invaded Italy, captured Rome, and was crowned emperor by the pope (896); d. A. D. 899.

Aromatic's, drugs, or other substances which yield a fragrant smell, and often a warm, pungent taste, as calamus, ginger, cinnamon, cassia, lavender, rosemary, laurel, nutmegs, cardamoms, pepper, pimento, cloves, vanilla, saffron. Some of them are used medicinally as tonics, stimulants, etc.

Arpad (ár-päd') (870-907), the hero of Hungarian ballad and romance, founder of the kingdom of Hungary. The Arpad dynasty reigned till 1301.

Arpino (ar-pē'nō), a town of southern Italy, province of Caserta, celebrated as the birthplace of Caius Marius and Cicero. It manufactures woollens, linen, paper, etc. Pop. 11,535.

Arquebus, a hand-gun; a species of fire-arm resembling a musket, anciently used. It was fired from a forked rest, and sometimes cocked by a wheel, and carried a ball that weighed nearly two ounces. A larger kind used in fortresses carried a heavier shot.

Ar'rah, a town of British India, in Shahabad district, Bengal, rendered famous during the mutiny of 1857 by the heroic resistance of a body of twenty civilians and fifty Sikhs, cooped up within a detached house, to a force of 3,000 sepoys, who were ultimately routed and overthrown by the arrival of a small European reinforcement. Pop. 42,998.

Ar'ran, an island of Scotland, in the Firth of Clyde, part of Bute county. Area 165 sq. mi. It is of a wild and romantic appearance, particularly the northern half, where the island attains its loftiest summit in Goatfell, 2,866 feet high. The geology of Arran has attracted much attention, as furnishing within a comparatively narrow space distinct sections of the great geological formations; while the botany possesses almost equal interest, both in the variety and the rarity of many of its plants.

Arras (á-rä), a town of France, capital of the department Pas-de-Calais, with several handsome squares and a citadel, cathedral, public library, botanic garden, museum, and numerous flourishing industries. In the Middle Ages it was famous for the manufacture of tapestry, to which the English applied the name of the town itself. Pop. 27,041.

Arrest of Judgment, in law, the staying or stopping of a judgment after verdict, for causes assigned. Courts have power to arrest judgment for intrinsic causes appearing upon the face of the record; as when the declaration varies from the original writ; when the verdict differs materially from the pleadings; or when the case laid in the declaration is not

Arsenic

sufficient in point of law to found an action upon.

Ar'ria, the heroic wife of a Roman named Cæcina Pætus. Pætus was condemned to death in 42 A. D., for his share in a conspiracy against the emperor Claudius, and was encouraged to suicide by his wife, who stabbed herself and then handed the dagger to her husband with the words, "It does not hurt, Pætus!"

Arrowroot, a starch largely used for food and for other purposes. Arrowroot proper is obtained from the rhizomes or root-stocks of several species of plants, and perhaps owes its name to the scales which cover the rhizome, which have some resemblance to the point of an arrow. Some, however, suppose that the



Arrowroot.

name is due to the fact of the fresh roots being used as an application against wounds inflicted by poisoned arrows, and others say that *arrow* is a corruption of *ara*, the Indian name of the plant. Brazilian arrowroot or tapioca meal, is got from the large, fleshy root of another variety, after the poisonous juice has been got rid of; and Oswego arrowroot from Indian corn.

Ar'ru (or Aroo) **Islands**, a group belonging to the Dutch, s. of western New Guinea, and extending from north to south about 127 mi. They are composed of coralline limestone, nowhere exceeding 200 feet above the sea, and are well wooded and tolerably fertile. The natives belong to the Papuan race, with an intermixture of foreign blood, and are partly Christians. The chief exports are trepang, tortoise-shell, pearls, mother-of-pearl, and edible birds'-nests. Pop. of group about 20,000.

Ar'senic, a metallic element of very common occurrence, being found in combination with many of the metals in a variety of minerals. It is of a dark-gray color, and readily tarnishes on exposure to the air, first changing to yellow, and finally to black. In hardness it equals copper; it is extremely brittle, and very volatile, beginning to sublime before it melts.

Arsinoe

It burns with a blue flame, and emits a smell of garlic. It forms alloys with most of the metals. Combined with sulphur it forms orpiment and realgar, which are the yellow and red sulphides of arsenic. With oxygen, arsenic forms two compounds, the more important of which is arsenious oxide or arsenic trioxide, which is the *white arsenic*, or simply *arsenic* of the shops. It is usually seen in white, glassy, translucent masses, and is obtained by sublimation from several ores containing arsenic in combination with metals, particularly from arsenical pyrites. Of all substances arsenic is that which has most frequently occasioned death by poisoning, both by accident and design. The best remedies against the effects of arsenic on the stomach are hydrated sesquioxide of iron or gelatinous hydrate of magnesia, or a mixture of both, with copious draughts of bland liquids of a mucilaginous consistence, which serve to procure its complete ejection from the stomach. Oils and fats generally, milk, albumen, wheat-flour, oatmeal, sugar or syrup, have all proved useful in counteracting its effect. Like many other virulent poisons it is a safe and useful medicine, especially in skin diseases, when judiciously employed. It is used as a flux for glass, and also for forming pigments. The arsenite of copper and a double arsenite and acetate of copper (emerald green) are largely used by painters; they are also used to color paper-hangings for rooms, a practise not unaccompanied with considerable danger, especially if flock-papers are used or if the room is a confined one. Arsenic has been too frequently used to give that bright green often seen in colored confectionery, and to produce a green dye for articles of dress and artificial flowers.

Arsinoe, a city of ancient Egypt on Lake Moeris, said to have been founded about B. C. 2300, but renamed after Arsinoë, wife and sister of Ptolemy II, of Egypt, and called also Crocodilopolis, from the sacred crocodiles kept at it.

Arsin, in common law, the malicious burning of a dwelling-house or outhouse of another man, which by the common law is felony, and which, if homicide result, is murder. Also, the wilful setting fire to any church, chapel, warehouse, mill, barn, agricultural produce, ship, coal-mine, and the like. In the U. S. and Great Britain it is a considerable aggravation if the burning is to defraud insurers.

Art, in its most extended sense, as distinguished from nature on the one hand and from science on the other, has been defined as every regulated operation or dexterity by which organized beings pursue ends which they know beforehand, together with the rules and the result of every such operation or dexterity. In this wide sense it embraces what are usually called the useful arts. In a narrower and purely æsthetic sense it designates what is more specifically termed the fine arts, as architecture, sculpture, painting, music, and poetry. The useful arts have their origin in positive practical needs, and restrict themselves to satisfying them. The fine arts minister to the

Arteries

sentiment of taste through the medium of the beautiful in form, color, rhythm, or harmony. See *Painting*, *Sculpture*, etc. In the Middle Ages it was common to give certain branches of study the name of arts.

Artaxerxes ("the mighty"), the name of several Persian kings.—1. ARTAXERXES, surnamed LONGIMANUS, succeeded his father, Xerxes I, B. C. 465. He subjected the rebellious Egyptians, terminated the war with Athens, governed his subjects in peace, and d. B. C. 425.—2. ARTAXERXES, surnamed MNEMON, succeeded his father, Darius II, in the year 405 B. C. After having vanquished his brother Cyrus he made war on the Spartans, who had assisted his enemy, and forced them to abandon the Greek cities and islands of Asia to the Persians. On his death, B. C. 359, his son Ochus ascended the throne under the name of—3. ARTAXERXES OCHUS (359 to 339 B. C.). After having subjected the Phœnicians and Egyptians, and displayed great cruelty in both countries, he was poisoned by his general Bagoas.

Artemis, an ancient Greek divinity, identified with the Roman Diana. She was the daughter of Zeus (Jupiter) and Leto (or Latona), and was the twin sister of Apollo, born in the island of Delos. She is variously represented as a huntress, with bow and arrows; as a goddess of the nymphs, in a chariot drawn by four stags; and as the moon goddess, with the crescent of the moon above her forehead. She was a maiden divinity, never conquered by love, except when Endymion made her feel its power. She demanded the strictest chastity from her worshipers, and she is represented as having changed Actæon into a stag, and caused him to be torn in pieces by his own dogs, because he had secretly watched her as she was bathing.

Artemisia, Queen of Caria, in Asia Minor, about 352–350 B. C., sister and wife of Mausolus, to whom she erected in her capital Halicarnassus, a monument called the Mausoleum, which was reckoned among the seven wonders of the world.

Artemisium, a promontory in Eubœa, an island of the Ægean, near which several naval battles between the Greeks and Persians were fought, B. C. 480.

Artemus Ward (CHARLES FARRAR BROWNE) (1834–1867), an American humorist, b. at Waterford, Maine, d. at Southampton, England. Originally a printer, he became editor of papers in Ohio, where his humorous letters became very popular. He subsequently lectured on California and Utah in the U. S. and in England, where he contributed to *Punch*. His writings consist of letters and papers by Artemus Ward, a pretended exhibitor of wax figures and wild beasts, and are full of drollery and eccentricity.

Arteries, the system of cylindrical vessels or tubes, membranous, elastic, and pulsatile, which convey the blood from the heart to all parts of the body, by ramifications which as they proceed diminish in size and increase in number, and terminate in minute capillaries

uniting the ends of the arteries with the beginnings of the veins. See *Anatomy*.

Artesian Wells, so called from the French province of Artois, where they appear to have been first used on an extensive scale, are perpendicular borings into the ground through which water rises to the surface of the soil, producing a constant flow or stream, the ultimate sources of supply being higher than the mouth of the boring, and the water thus rising by the well-known law. They are generally sunk in valley plains and districts where the lower previous strata are bent into basin-shaped curves. The rain falling on the outcrops of these, saturates the whole porous bed, so that when the bore reaches it the water by hydraulic pressure rushes up toward the level of the highest portion of the strata. The supply is sometimes so abundant as to be used extensively as a moving power, and in arid regions for fertilizing the ground, to which purpose artesian springs have been applied from a very remote period. Thus many artesian wells have been sunk in the Algerian Sahara which have proved an immense boon to the district. The water of most of these is potable, but a few are a little saline, though not to such an extent as to influence vegetation. The hollows in which London and Paris lie are both perforated in many places by borings of this nature. One of the most celebrated artesian wells is that of Grenelle, near Paris, 1,798 feet deep, completed in 1841, after eight years' work. One of the deepest is at Rochefort, in France, 2,765 feet. Wells of great depth are also found in America. As the temperature of water from great depths is invariably higher than that at the surface, artesian wells have been made to supply warm water for heating manufactories, greenhouses, hospitals, fishponds, etc. The oil wells of America are of the same technical description. These wells are now made with larger diameters than formerly, and altogether their construction has been rendered much more easy in modern times.

The process of boring artesian wells, drive-wells, oil, or gas-wells has become a distinct branch of hydraulic engineering. In driving a tube well either a horse-power machine or a steam engine is used as power. A hole is bored for some distance and cased with an iron pipe which is driven into the hole by means of a drill-rod which may be lengthened from time to time by screwing sections onto it. The drill-rods are made of iron pipe, and about every 30 feet in the hollow drill-rod is a valve which opens from underneath. In the drill at the bottom of the rod is a hole, and as the drill is lifted and dropped alternately by the mechanism on the ground, water is poured into the well, forming a slush of the crushed earth, clay, or gravel, which enters the drill rod through a hole in the drill. When the drill is lifted the rods containing the water and slush are raised, the drill is dropped suddenly and the slush and water pass into the next section above through the valves, which close when the drill is again raised. Thus the

drillings are lifted to the surface and are there discharged. As fast as the drill crushes its way deeper into the earth, iron casing is driven down. A pump is always attached to the head of the apparatus and started when water is reached. The sand in the gravel bed is pumped out, thus forming a reservoir in the clean gravel. Another method is known as the rolling and jetting process. This combines the principles of hydraulic mining and the diamond drill. A diamond drill cuts its way into the earth and rock by revolving a drill point studded with black diamonds. In the rolling and jetting system used, the cutter is a section of pipe on the lower end of which teeth are cut. This is revolved in the ground by a machine which grips the pipe. Jets of water are forced down inside of the pipe, the water rushes out from under the cutter's teeth and returns to the surface on the outside of the pipe, thus forming a water cushion between the pipe and the earth and lessening the friction. Whenever a material is struck which is too hard to be cut by the steel cutter, a cutter set with black diamonds is used. Enormous augers, which bore holes from 8 to 30 inches in diameter, are used to sink shallow wells. Wells more than 60 feet deep are almost universally bored with well-driving machinery. In boring shallow wells a large auger is fixed to the end of a vertical shaft and twisted around. Such wells are cased with stone or brick.

Arteveld (Artevelde) (är'te-velt, är'te-vel-de), the name of two men distinguished in the history of the Low Countries. 1. **JACOB VAN**, a brewer of Ghent, b. about 1300; was selected by his fellow townsmen to lead them in their struggles against Count Louis of Flanders. In 1338 he was appointed captain of the forces of Ghent, and for several years exercised a sort of sovereign power. A proposal to make the Black Prince, son of Edward III of England, governor of Flanders, led to an insurrection, in which Arteveld lost his life. (1345). 2. **PHILIP**, son of the former, at the head of the forces of Ghent, gained a great victory over the Count of Flanders, Louis II, and for a time assumed the state of a sovereign prince. Arteveld fell with 25,000 Flemings at Roosebake in 1382.

Arthur, **CHESTER ALAN** (1830-1886), twenty-first president of the U. S.; the son of Scottish parents, his father being pastor of Baptist churches in Vermont and New York. He chose law as a profession, and practised in New York. As a politician he became a leader in the Republican party. During the Civil War he was energetic as quartermaster general of New York in getting troops raised and equipped. He was afterward collector of customs for the port of New York. In 1880 he was elected vice-president, succeeding as president on the death of Garfield in 1881.

Ar'thur, **KING**, an ancient British hero of the sixth century, son of Uther Pendragon, and the Princess Igera, wife of Gorlois, duke of Cornwall. He married Guinevere (or Ginevra); established the famous order of the

Arthur

Round Table; and reigned twelve years in peace. After this he conquered Denmark, Norway, and France, and went to Rome. While away, Modred, his nephew, stirred up his subjects to rebellion. He subdued the rebels, but died in consequence of his wounds, on the island of Avalon. The story of Arthur is supposed to have some foundation in fact.

Arthur, TIMOTHY S. (1809-1885), born in Orange co., N. Y. He wrote many popular domestic tales, and founded *Arthur's Home Magazine*.

Arthur's Seat, a picturesque hill near Edinburgh, Scotland; altitude 822 feet. It is composed of a diversity of eruptive rocks, with some interposed and uptilted sedimentary ones; and derives its name from the legendary King Arthur.

Artichoke, a well-known plant somewhat resembling the thistle, with large, divided, prickly leaves. The erect flower-stem terminates in a large, round head of numerous



Artichoke.

imbricated oval, spiny scales which surround the flowers. The fleshy bases of the scales, with the large receptacle, are the parts that are eaten. The Jerusalem artichoke is a species of sunflower, whose roots are used like potatoes.

Articles, THE THIRTY-NINE, of the Church of England, a statement of the particular points of doctrine, thirty-nine in number, maintained by the English Church; first promulgated by a convocation held in London in 1562-63, and confirmed by royal authority; founded on, and superseding, an older code issued in the reign of Edward VI. They were ratified anew in 1604 and 1628. All candidates for ordination must subscribe to these articles. This formulary is now accepted by the Episcopal Churches of Scotland, Ireland, and America.

Articula'ta, the third great section of the animal kingdom, according to the arrangement of Cuvier, including all the invertebrates with the external skeleton forming a series of rings articulated together and enveloping the body, distinct respiratory organs, and an internal ganglionated nervous system along the middle line of the

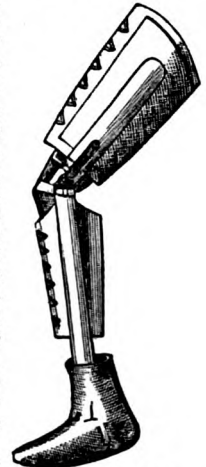
Artificial Limbs

body. They are divided into five classes. The first four classes are now commonly placed together under the name of *Arthropoda*, and the whole are sometimes called *Arthrozoa*.

Articula'tion, in anatomy a joint; the joining or juncture of the bones. This is of three kinds: 1, a movable connection, such as the ball-and-socket joint; 2, immovable connection, as by suture, or junction by serrated margins; 3, union by means of another substance, by a cartilage, tendon, or ligament.

Artificial Limbs are made principally of extra fine close-grained wood of the English weeping willow. Within the last few years aluminum has come into use to a considerable extent and is particularly valuable on account of its lightness, strength, and non-corrosive quality. When made of wood, the piece is first turned in the lathe to the general shape of a leg or arm and then hollowed out until the shell is from one fourth to five eighths of an inch thick. It is then whittled down to the general shape required, when the proper angles and depression in the top of the inside portion are cut so that it will exactly fit the stump for which it is intended. Upon the accuracy of this fit depends the comfort which the wearer will take with it. The foot is whittled out by hand entirely, and fastened to the leg by means of a hinge, and the more expensive pieces have another hinge fitted up for the toes. When the amputation is above the knee another hinge is prepared

for the knee-joint so that the leg will swing readily in walking. After the wooden pieces have been completed and polished a fine piece of rawhide is shrunk over them and fastened by means of glue. As it dries it shrinks and adds much strength, and does not increase the weight materially. The bottom of the foot is made of soft rubber for the purpose of giving a natural spring in walking. After the leg has been painted it is ready for use. Limbs are attached usually by means of leather bands which may be laced tight, or they are held up by straps running over the shoulders like suspenders.



Artificial Leg.

Arms are often so fitted that the hand may be unscrewed and a knife or fork, or hair brush, made especially for the purpose, can be put in its place. Deformed feet are often pieced out with blocks of wood whittled to the proper shape. An ordinary artificial hand of the best make is worth about \$100, legs from \$50 to \$125, and arms from \$50 to \$150. Under the general head of the manufacture of artificial limbs is included the manufacture of ears, fingers and noses. A nose for instance is first molded

Artillery

in the proper shape from *papier maché*. It is then waxed and varnished to the tint of the complexion of the noseless person. It is fastened on by means of a pair of spectacles to the nose piece, to which it is firmly attached, or where the remaining stump is large enough, it is clamped in place. Ears are made in the same way but are more difficult to attach. They are usually attached by means of small springs which fit into the ear duct. Artificial eyes are made of glass. First a bulb is blown from molten glass and when cold one side is carefully broken off so as to leave a shell, the edges of which are blunted by melting. The proper size of eye is secured by measurement and the eye designed is worked by placing the bulb over a Bunsen burner so that its upper surface will just touch the flame. In this way little sticks of varied colored glass are worked into the eye design. Great skill is required to make the iris and the retina of the proper color and shape.

Artillery, all sorts of great guns, cannon, or ordnance, mortars, howitzers, machine-guns, etc., together with all the apparatus and stores thereto belonging, which are taken into the field, or used for besieging and defending fortified places. The improvements and alterations in artillery and projectiles have of late years been extraordinary. The most important modern improvement in artillery, besides the increase in size, is the general adoption of rifled ordnance, breech-loaders, and machine-guns. See *Cannon* and other articles. The name *artillery* is also given to the land troops by whom these arms are served, whether they accompany an army in the field, take part in sieges, or occupy fixed posts.

Artois (âr-twä), a former province of France, anciently one of the seventeen provinces of the Netherlands, now almost completely included in the department of Pas de Calais.

Arts, the name given to certain branches of study in the Middle Ages, originally called the "liberal arts" to distinguish them from the "servile arts" or mechanical occupations. These arts were usually given as grammar, dialectics, rhetoric, music, arithmetic, geometry, and astronomy. Hence originated the terms "art classes," "degrees in arts," "Bachelor of Arts," "Master of Arts," etc., still in common use in universities, the faculty of arts being distinguished from those of divinity, law, medicine, or science.

Arundelian Marbles, a series of ancient sculptured marbles discovered by William Petty, who explored the ruins of Greece at the expense of and for Thomas Howard, earl of Arundel, who lived in the time of James I and Charles I, and was a liberal patron of scholarship and art. After the Restoration they were presented by the grandson of the collector to the University of Oxford. Among them is the Parian Chronicle, a chronological account of the principal events in Grecian, and particularly in Athenian history, during a period of 1,318 years, from the reign of Cecrops

Asben

(B. C. 1450) to the archonship of Diognetus (B. C. 264).

Aruwimi, a large river of equatorial Africa, a tributary of the Congo, which it enters from the north.

Arval Brothers, a college or company of twelve members elected for life from the highest ranks in ancient Rome, so called from offering annually public sacrifices for the fertility of the fields.

Arvic'ola, a genus of rodent animals, sub-order Mice. It includes the water-vole (or water-rat), and the field-vole or short-tailed field-mouse.

A'ryan (or Indo-European Family of Languages). See *Indo-European Family*.



As.

As, a Roman weight of 12 oz., answering to the libra or pound, and equal to 237.5 grains avoirdupois, or 327.1873 grams, French measure. In the most ancient times of Rome the copper or bronze coin which was called *as*, actually weighed an *as*, or a pound, but in 264 B. C. it was reduced to 2 oz., in 217 to 1 oz., and in 191 to $\frac{1}{2}$ oz.

A'sa, great grandson of Solomon and third king of Judah. He died after a prosperous reign of 41 years.

Asafet'ida (asa-fœtida), a fetid insipidated sap from Central Asia, the solidified juice of a large umbelliferous plant. It is used in medicine as an anti-spasmodic, and in cases of flatulency, in hysteric paroxysms, and other nervous affections. Notwithstanding its very disagreeable odor it is used as a seasoning in the East, and sometimes in Europe.

A'saph, a Levite and psalmist appointed by David as leading chorister in the divine services. He founded a school of poets and musicians, which were called, after him, "the sons of Asaph."

Asarabac'ca, a small, hardy European plant. Its leaves are acrid, bitter, and nauseous, and its root is extremely acrid. Both the leaves and root were formerly used as an emetic. The Canada snake-root is found in the western states.

Asben (Air, or Ahir), a kingdom of Africa.



Ferula Asafetida.

Asbestos

in the Sahara. The inhabitants are Tuaregs (or Berbers), with an admixture of negro blood. They live partly in villages, partly as nomads. It is nominally ruled over by a sultan, who resides in the capital, Agades. Pop. about 60,000.

Asbes'tos (asbestos), a remarkable and highly useful mineral, a fibrous variety of several members of the hornblende family, composed of separable filaments, with a silky luster. The fibers are sometimes delicate, flexible, and elastic; at other times stiff and brittle. It is incombustible, and anciently was wrought into a soft, flexible cloth, which was used as a shroud for dead bodies. Some varieties are compact and take a fine polish, others are loose, like flax or silky wool. *Mountain-wood* is a variety presenting an irregular filamentous, structure, like wood. *Rock-cork*, *mountain-leather*, *fossil-paper*, and *fossil-flax*, are varieties.

Asbestos is always found in connection with a hard, crystal-like substance. The veins of asbestos as found in the mines are from two to four inches in thickness and separated by thin layers of hornblende crystals. The nearer to the surface the veins run the coarser are the fibers and therefore the less valuable. The most improved quarrying machinery is used in mining asbestos. Holes are drilled in long rows into the sides of the cliffs by means of steam drills. These holes are then loaded with dynamite and exploded simultaneously by electricity, thus a whole section of an asbestos cliff is broken off in one lump. The workmen break out as much of the pure asbestos as possible and convey it by means of trucks to the "cob house." Here the asbestos is separated from the pieces of rock and placed in rough bales and shipped to the factory. The proportion of asbestos in the amount of material quarried is about 1 to 25. As asbestos comes from the mines it is in small lumps of a greenish or yellowish hue and the edges are furred with loose fibers. The best grades of asbestos are nearly white. Another important item is the length of the fibers, the longest being the most valuable. After the asbestos, roughly baled, reaches the factory, it is dumped into hoppers of powerfully built machines and there crushed through a series of rolls until the fibers are separated into fluffy masses when it passes out into a separator where the small pieces of stone and dirt are extracted. The short fibers are taken out and sent to the pulp mill where they are ground up fine for the manufacture of solid packing for steam pistons, mill-board, and other commodities. The long fibers are gathered together, carded, and spun into yarn, just like cotton or wool, after which the substance may be woven into cloth as desired. Asbestos cloth is of a dirty white color and has a soapy feeling.

Asbestos has been known for ages as mountain cork or mountain leather, but its geological history and formation is still a matter of conjecture. Its attributes, too, have been known; but until about twenty years ago, very little

Ascension

practical use has been made of the substance. To-day it forms one of the giant industries of the U. S. The uses of asbestos are many and varied. Ground fine and combined with colors and oils in a certain manner it makes a paint. Roofs are made by treating strong canvas with a combination of asbestos and felt, and backing it with manilla paper. It is extensively used for roofs of factories, railroad shops, bridges, and other places where there is danger of fire. Steam-pipes are covered with asbestos, and asbestos cement is used for hot-blast pipes and fire-heated surfaces. It is used for locomotive pistons, valve-stems, and oil pumps. It is made into ropes and mill-boards, and in some states, theaters are required to use an asbestos drop curtain to protect the audience in case of a fire in the scenery. Iron and glass workers use mittens knit from asbestos yarn. Asbestos soldering blocks are used by goldsmiths. Asbestos, in combination with rubber, is much used as an electrical insulator. Asbestos cloth is used for acid filters in all sorts of chemical processes for the reason that no acid will eat it. Asbestos is found in Italy and Canada, and rich deposits have recently been found in Wyoming, California, and Montana. At present Canada is the principal source of supply. A good asbestos mine is considered to be worth more than a gold mine; and as new uses for the substance are found, it becomes more valuable.

Asbjornsen (ás'byeurn-sen), PETER KRISTEN, b. 1812, d. 1885, a distinguished Norwegian naturalist and collector of the popular tales and legends, fairy stories, etc., of his native country.

Asbury Park, a small town on the coast of New Jersey, a great summer resort, its population being in summer increased from 4,000 to 20,000 or 25,000.

Asbury, FRANCIS (1745-1846), M. E. bishop, b. in Handsworth, England, d. in Spottsylvania, Va. He was the first bishop of the M. E. church ordained in this country. He came as a missionary to this country, 1771, and was made general assistant to John Wesley. In 1777 the ministers of his church, at a conference in Maryland, decided that they should return to Europe; Asbury, alone, chose to remain. He was unanimously elected bishop and consecrated by Doctor Coke, 1784, with a fixed salary of \$64 per year. His annual travels extended from Canada to the Mississippi River.

As'calon (or Ash'kelon), a ruined town of Palestine, on the seacoast, 40 mi. w. s. w. of Jerusalem. It was occupied by the Crusaders under Richard I after a great battle with Saladin (1192).

Asca'nius, the son of Æneas and Creusa, and the companion of his father's wanderings from Troy to Italy.

Ascen'sion (discovered on Ascension Day), an island of volcanic origin belonging to Britain, near the middle of the South Atlantic Ocean, 800 mi. n. w. of St. Helena. Area about 36 sq. mi.; pop. 165. It is retained by Britain mainly as a station at which ships may

Ascension

touch for stores. It has a steam factory, naval and victualing yards, hospitals, and a coal depot.

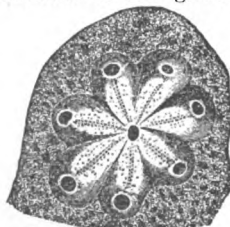
Ascension, Right, of a star, in astronomy, the arc of the equator intercepted between the first point of Aries and that point of the equator which comes to the meridian at the same instant with the star.

Ascension Day, the day on which the ascension of the Saviour is commemorated, often called *Holy Thursday*; a movable feast, always falling on the Thursday but one before Whitsuntide.

Ascham (as'kam), ROGER (1515-1568), a learned Englishman, born in Yorkshire. He became Latin secretary to Edward VI and also to Mary. Was preceptor to Elizabeth during her girlhood and her secretary after she ascended the throne. In 1544 he wrote a book in praise of his favorite amusement and exercise—archery. In 1563-68 he wrote his *Schoolmaster*, a treatise on the best method of teaching children Latin. His life was written by Dr. Johnson to accompany an edition of his works published in 1769.

Aschersleben (ash'érz-lā-ben), a town of Prussian Saxony, in the district of Magdeburg, near the junction of the Elbe with the Wipper. Industries: woollens, machinery, and metal goods, sugar, paper, etc. Pop. 21,519.

Ascid'ia, the name given to the "Sea-squirts" or main section of the Tunicata, molluscous animals of low grade, resembling a double-



Compound Ascidian.

necked bottle, of a leathery or gristly nature, found at low-water mark on the sea-beach, and dredged from deep water attached to stones, shells, and fixed objects. One of the prominent openings admits the food and the water required in respiration, the other is the excretory aperture. A single ganglion represents the nervous system, placed between the two apertures. Male and female reproductive organs exist in each ascidian. They pass through peculiar phases of development, the young ascidian appearing like a tadpole-body. They may be *single* or *simple*, *social* or *compound*.

Ascle'piades (-dez), the name of a number of ancient Greek writers—poets, grammarians, etc.—of whom little is known, and also of several ancient physicians, the most celebrated of whom was ASCLEPIADES, of Bithynia, who acquired considerable repute at Rome about the beginning of the first century B. C.

Ascle'pias (or Swallow-wort), a genus of plants, the type and the largest genus of the natural order Asclepiadaceæ. Most of the species are North American herbs, having opposite, alternate, or verticillate leaves. Many of them possess powerful medicinal qualities. One is diaphoretic and sudorific, and has the singular property of exciting general perspiration without increasing in any sensible degree

Ashantee

the heat of the body; another is emetic, and its roots are frequently sent to England as ipecacuanha; the roots of a third are famed for diaphoretic properties.

As'coli (or Ascoli Piceno), a town in middle Italy, capital of the province of the same name. Pop. 11,199. The province has an area of 809 sq. mi.; a pop. of 222,146.

As'gard (lit. gods' yard, or the abode of the gods), in Scandinavian mythology, the home of the gods or *Æsir*, rising, like the Greek Olympus, from *midgard*, or the middle world, that is, the earth.

Ash, a genus of deciduous trees, having imperfect flowers and a seed-vessel prolonged into a thin wing at the apex. There are a good many species, chiefly indigenous to Europe and North America. It is one of the most useful trees on account of its hard, tough wood and the rapidity of its growth. There are many varieties of it, as the weeping ash, the curled-leaved ash, the entire-leaved ash, etc. The flowering, or manna-ash, is a native of the south of Europe and Palestine. It yields the substance called manna, which is obtained by making incisions in the bark, when the juice exudes and hardens. Among the American species are the white ash, with lighter bark and leaves; the red or black ash, with a brown bark; the black ash, the blue ash, the green ash, etc. They are all valuable trees. The mountain-ash or rowan belongs to a different order.

Ash (Ashes), the incombustible residue of organic bodies (animal or vegetable) remaining after combustion; in common usage, any incombustible residue of bodies used as fuel; as a commercial term, the word generally means the ashes of vegetable substances, from which are extracted the alkaline matters called potash, pearl-ash, kelp, barilla, etc.

Ashan'go, a region in the interior of Southern Africa, belonging now to the French. The inhabitants belong to the Bantu stock, and among them are a dwarfish people, the Obongo, said to be about 4½ feet high at most.

Ashanti, a kingdom of West Africa, in the interior of the Gold Coast. Area about 70,000 sq. mi. Gold is abundant, being found either in the form of dust or in nuggets. The Ashantis are warlike and ferocious, with a love of shedding human blood amounting to a passion, human sacrifices being common. The government is a despotic monarchy. The chief town is Coomassie, which, before being burned down in 1874, was well and regularly built with wide streets, and had from 70,000 to 100,000 inhabitants. The British first came in contact with the Ashantis in 1807, and hostilities continued, off and on, till 1826, when they were driven from the seacoast. Immediately after the transfer of the Dutch settlements on the Gold Coast to Britain in 1872—when the entire coast remained in British hands—the Ashantis reclaimed the sovereignty of the tribes round the settlement of Elmina. This brought on a sanguinary war, leading to a British expedition in 1874, in which Coomassie was captured, and British

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TYPES OF ASIATIC RACES. 1. Jukagire from Kolima. 2. Ostjakin (Tinbak). 3. Mongolian, Karak (Utshur). 4. Man of Kashmir. 5. Chinese Woman. 6. Chinaman. 7. Singhalese (Ceylon). 8. Man of Kashmir. 9. Iranian, Woman. 10. Wedda (Ceylon). 11. Woman and Child of Nigrito (Philippine Islands). 12. Japanese. 13. Japanese. 14. Japanese. 15. Japanese. 16. Japanese. 17. Japanese. 18. Japanese. 19. Japanese. 20. Japanese. 21. Japanese. 22. Japanese.



4. (Shchutana). 5. Turk Kirghiz. 6. Tungusin, Tshapogin.
 7. Malavans (Philippine Islands). 16. Tuda (Nilgiri, India).
 17. Linkiu. 24. Corean. 25. Ainu (Jesso).



1. (a) (Tibet), 3. Mongol, 4.
 Man of Kashmir, 5.
 (a) (the 'Sands'), 21. Japs.



4. Radshput (Radshputana). 5. Turk, Kirghiz. 6. Tungusin, Tshapogirin. 7. Jakutin of Utshur. 8. Tibetanian
 14. Malayans. 15. Malayans (Philippine Islands). 16. Tuda (Nilgiri, India). 17. Andamenian. 18. Andamenian
 man. 23. Man of Linkiu. 24. Corean. 25. Ainu (Jesso).

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Ashburton Treaty

supremacy established along the Gold Coast. In 1896 another expedition became necessary and was successfully concluded. King Prempeh was deposed and imprisoned and the country annexed. They rebelled again in 1900, but were defeated.

Ashburton Treaty, a treaty concluded at Washington, 1842, by Daniel Webster and Lord Ashburton. It defined the n. e. boundaries between the U. S. and Canada.

Asheville, Buncombe co., N. C., near French, Broad, and Swannanoa rivers, 140 mi. e. of Knoxville. Railroad: Southern. Industries: cotton mills, flouring mill, two iron foundries, cigar and furniture factories, and saw mill. Surrounding country mostly agricultural. The town was first settled in 1794, and was then called Morris, but was shortly afterward changed to its present name in honor of Governor Ashe. Was incorporated in 1833. Pop. 1900, 14,694.

Ashland, Schuylkill co., Pa., 120 mi. s. w. of Philadelphia. Railroads: Philadelphia & Reading, and Lehigh Valley. Industries: steam pump works, flour mill, two iron foundries, two screen factories, three planing-mills, shoe and shirt factories, and powder-mill. Surrounding country partly agricultural, largely anthracite coal mining. The town was first settled in 1847 and became a borough in 1857. Pop. 1900, 6,438.

Ashland, co. seat of Ashland co., Wisconsin, 410 m. from Chicago, on Lake Superior; important port of entry; the center of vast lumber, iron and brown-stone industries. Railroads: Northern Pac.; Wis. Cent.; Chi. St. P., Min. & O. Pop. 1900, 13,074.

Ashtabula, city of Ashtabula co., O., on the Ashtabula river, 3 m. from Lake Erie and 54 m. n. e. of Cleveland; on the Lake Shore & Mich. Southern, the N. Y., Chi. & St. L. and the Pitts., Youngstown & Ashtabula railroads. The city has a splendid harbor and does a large shipping business in coal and iron ore. It has woolen mills, tanneries, shaft factories, farm implement works, an electric light plant, waterworks, a park and fine public buildings. The town was settled in 1803. Pop. 1900, 12,949.

Ash-Wednesday, the first day of Lent, so called from a custom in the Western Church of sprinkling ashes that day on the heads of penitents, then admitted to penance.

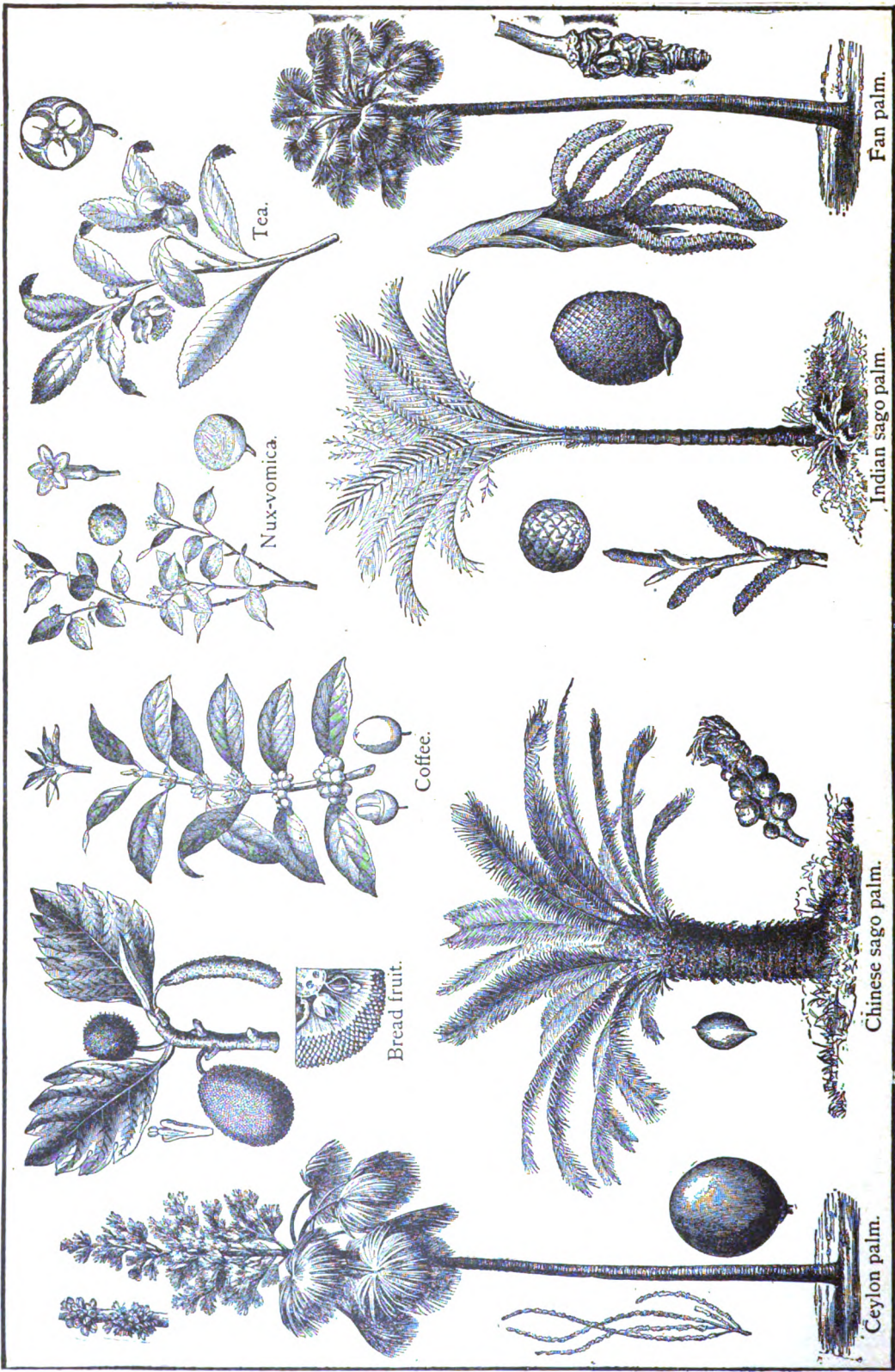
Asia, the largest of the great divisions of the earth. Area est. at 17,296,000 sq. mi., about a third of all the land of the earth's surface. On three sides, n., e., and s., the ocean forms its natural boundary, while in the w. the frontier is marked mainly by the Ural Mountains, the Ural River, Caspian Sea, the Caucasus, the Black Sea, the Mediterranean, the Suez Canal, and the Red Sea. There is no proper separation between Asia and Europe, the latter being really a great peninsula of the former. Asia, though not so irregular in shape as Europe, is broken in the s. by three great peninsulas, Arabia, Hindustan, and Farther India, while the e. coast presents peninsular projections and islands, forming a series

Asia

of sheltered seas and bays, the principal peninsulas being Kamtchatka and Corea. The principal islands are those forming the Malay or Asiatic Archipelago, which stretch round in a wide curve on the s. e. of the continent. Besides the larger islands—Sumatra, Java, Borneo, Celebes, Mindanao, and Luzon (in the Philippine group)—there are countless smaller islands grouped round these. Other islands are Ceylon, in the s. of India; the Japanese islands and Sakhalin on the e. of the continent; Formosa, s. e. of China; Cyprus, s. of Asia Minor; and New Siberia and Wrangell Land, in the Arctic Ocean.

Political Divisions.—A large portion of Asia is under the dominion of European powers. Russia possesses the whole of Northern Asia (Siberia) and a considerable portion of Central Asia, together with a great part of ancient Armenia, on the s. of the Caucasus (pop. 16,000,000); Turkey holds Asia Minor, Syria, and Palestine, part of Arabia, Mesopotamia, etc. (pop. 16,000,000); Great Britain rules over India, Ceylon, a part of the Indo-Chinese Peninsula (Upper and Lower Burma) and several other possessions (pop. 290,000,000); France has acquired a considerable portion of the Indo-Chinese Peninsula, and has one or two other settlements (pop. 18,000,000); while to Holland belong Java, Sumatra, and other islands, and to the United States the Philippine Islands. The chief independent states are the Chinese Empire (pop. 386,000,000), Japan (pop. 40,000,000), Siam (pop. 6,000,000), Afghanistan (pop. 5,000,000), Baluchistan, Persia (pop. 7,000,000), and the Arabian states (pop. 3,000,000). The most important of the religions of Asia are the Brahmanism of India, the creeds of Buddha, Confucius, and Lao-tse in China, and the various forms of Mohammedanism in Arabia, Persia, India, etc. Probably more than half of the whole population profess some form of Buddhism. Several native Christian sects are found in India, Armenia, Kurdistan, and Syria.

Surface, Rivers, and Lakes.—The mountain systems of Asia are of great extent, and their culminating points are the highest in the world. The greatest of all is the Himalayan system, which lies mainly between lon. 70° and 100° e. and lat. 28° and 37° n. It extends, roughly speaking, from northwest to southeast, its total length being about 1,500 mi., forming the northern barrier of Hindustan. The loftiest summits are Mount Everest, 29,002 feet high, another peak 28,265, and Kinchinjinga, 28,156. The principal passes, which rise to the height of 18,000 to 20,000 feet, are the highest in the world. A second great mountain system of Central Asia, connected with the northwestern extremity of the Himalayan system by the elevated region of Pamir, is the Thian-Shan system, which runs northeastward for a distance of 1,200 mi. In this direction, the Altai, Sayan, and other ranges continue the line of elevations to the northeastern coast. A northwestern continuation of the Himalayas is the Hindu Kush, and farther westward a connection may be traced between the Hima-



Tea.



Nux-vomica.

Coffee.



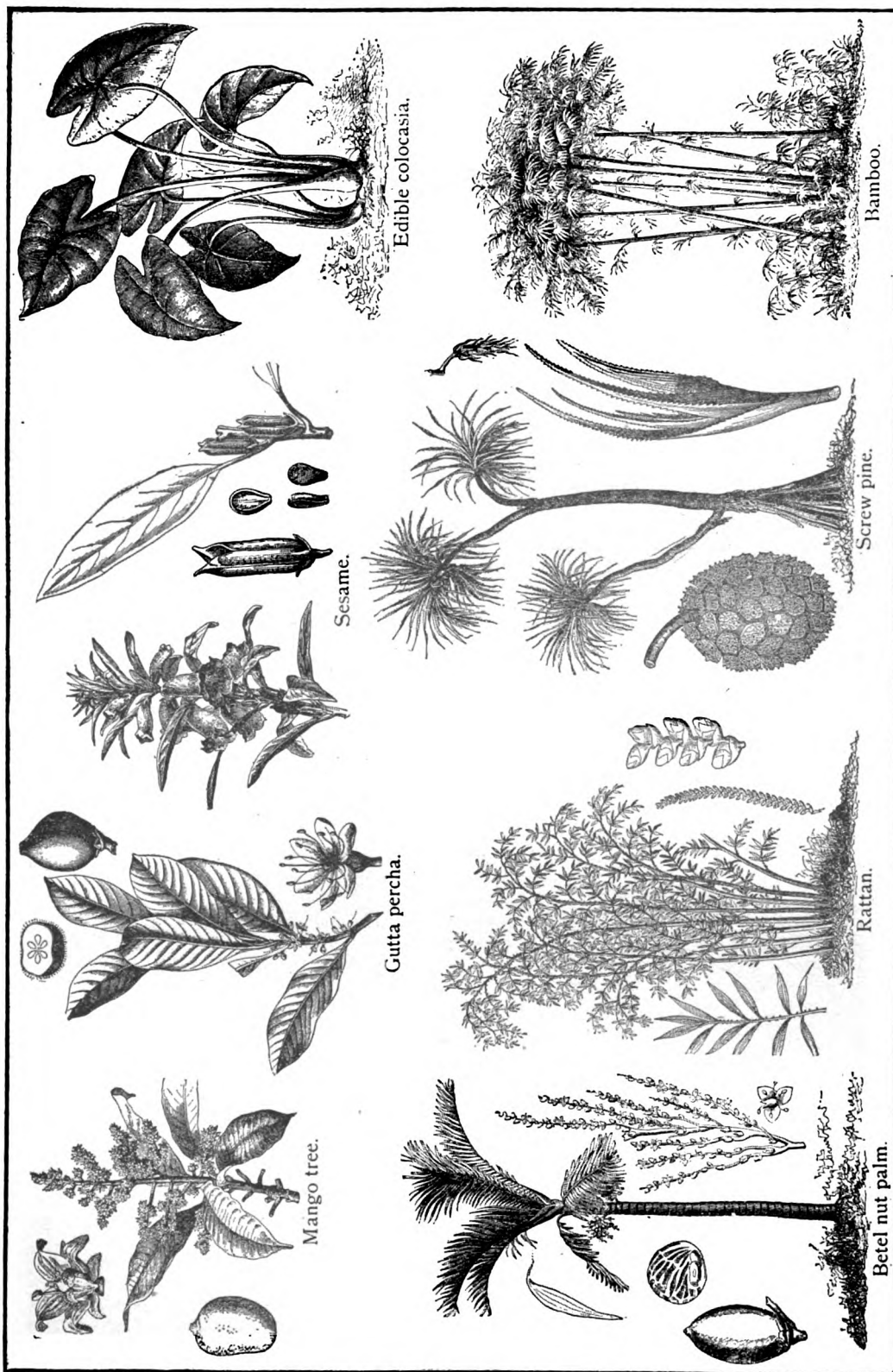
Bread fruit.

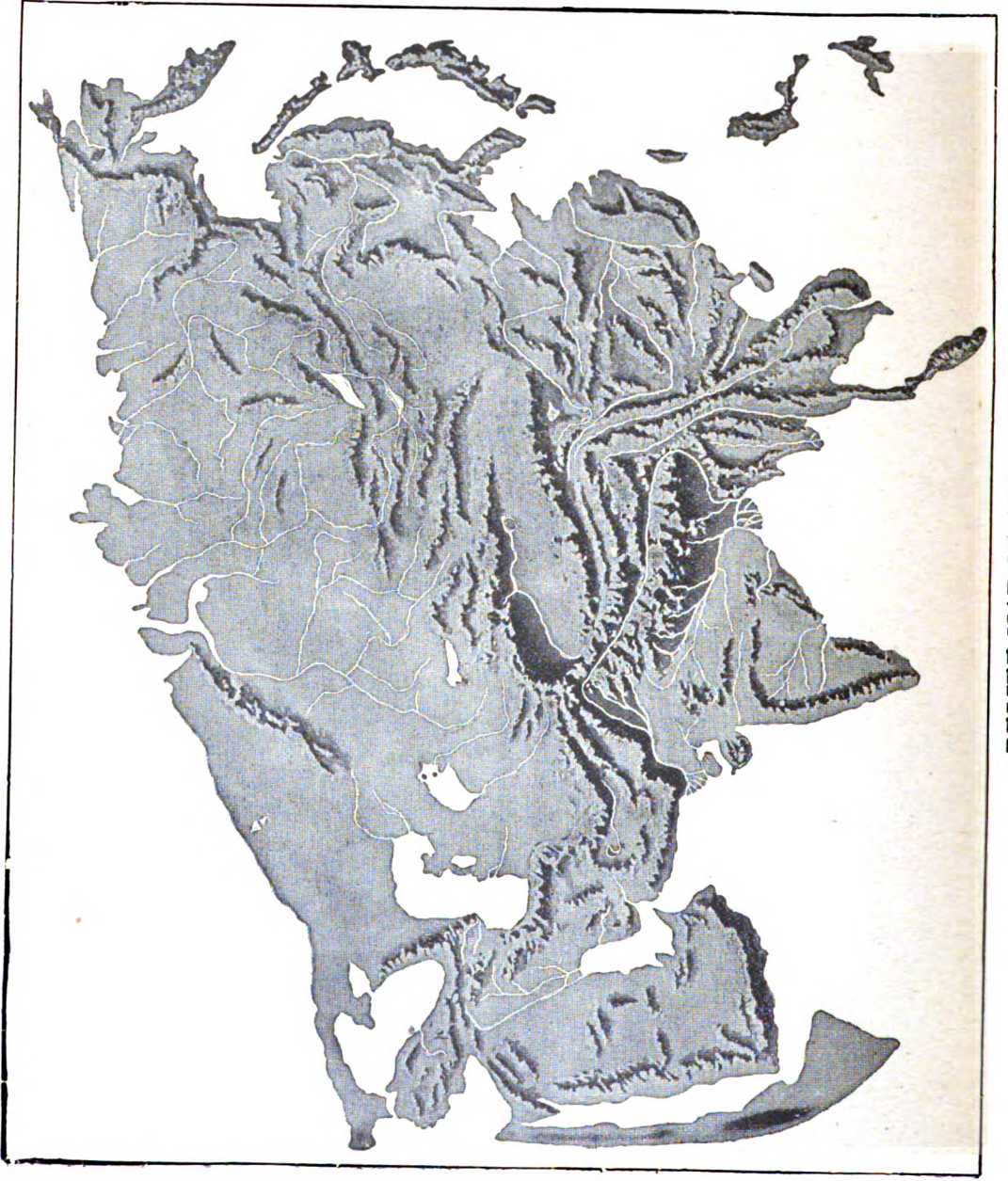
Fan palm.

Indian sago palm.

Chinese sago palm.

Ceylon palm.





RELIEF MAP OF ASIA.

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1. The first step is to identify the main topic of the document.

Asia

layan mass and the Elburz range (18,460 ft.), south of the Caspian, and thence to the mountains of Kurdistan, Armenia, and Asia Minor. There are vast plateaus and elevated valley regions connected with the great central mountain systems, but large portions of the continent are low and flat. Thibet forms the most elevated table-land in Asia, its mean height being estimated at 15,000 feet. On its south is the Himalayan range, while the Kuen-Lun range forms its northern barrier. Another great but much lower plateau is that which comprises Afghanistan, Beluchistan, and Persia, and which to the northwest joins into the plateau of Asia Minor. The principal plain of Asia is that of Siberia, which extends along the north of the continent and forms an immense alluvial tract sloping to the Arctic Ocean. Vast swamps or peat-mosses called *tundras* cover large portions of this region. Southwest of Siberia, and stretching eastward from the Caspian, is a low-lying tract consisting, to a great extent, of steppes and deserts, and including in its area the Sea of Aral. In the east of China there is an alluvial plain of some 200,000 sq. mi. in extent; in Hindustan are plains extending for 2,000 mi. along the south slope of the Himalayas; and between Arabia and Persia, watered by the Tigris and Euphrates, is the plain of Mesopotamia or Assyria, one of the richest in the world. Of the deserts of Asia the largest is that of Gobi (lon. 90° – 120° e., lat. 40° – 48° n.), large portions of which are covered with nothing but sand or display a surface of bare rock. An almost continuous desert region may also be traced from the desert of North Africa through Arabia (which is largely occupied by bare deserts), Persia, and Beluchistan to the Indus.

Some of the largest rivers of Asia flow northward to the Arctic Ocean—the Obi, the Yenisei, and the Lena. The Hoang-Ho, and Yangtse, and the Amoor, are the chief of those which flow into the Pacific. The Ganges, Brahmaputra, Irawaddy, and Indus empty into the Indian Ocean. The Persian Gulf receives the united waters of the Euphrates and the Tigris. There are several systems of inland drainage, large rivers falling into lakes which have no outlet.

The largest lake of Asia (partly also European) is the Caspian Sea, which receives the Kur from the Caucasus (with its tributary the Aras from Armenia), and the Sefid Rud and other streams from Persia (besides the Volga from European Russia, and the Ural, which is partly European, partly Asiatic). The Caspian lies in the center of a great depression, being 83 feet below the level of the Sea of Azof. East from the Caspian is the Sea of Aral, which, like the Caspian, has no outlet, and is fed by the rivers Amoo Daria (Oxus) and Syr Daria. Still farther east, to the north of the Thian-Shan Mountains, and fed by the Ili and other streams, is Lake Balkash, also without an outlet and very salt. Other lakes having no communication with the ocean are Lob Nor, in the desert of Gobi, receiving the river Tarim, and the Dead Sea, far below the level of the Mediterranean,

Asia

and fed by the Jordan. The chief fresh-water lake is Lake Baikal, in the south of Siberia, between lon. 104° and 110° e., a mountain lake from which Yenisei draws a portion of its waters.

Geology.—Geologically speaking large areas of Asia are of comparatively recent date, the lowlands of Siberia, for instance, being submerged during the tertiary period, if not more recently. Many geologists believe that subsequently to the glacial period there was a great sea in Western Asia, of which the Caspian and Aral Seas are the remains. The desiccation of Central Asia is still going on, as is also probably the upheaval of a great part of the continent. The great mountain chains and elevated plateaus are of ancient origin, however, and in them granite and other crystalline rocks are largely represented. Active volcanoes are only met with in the extreme east (Kamtchatka) and in the Eastern Archipelago. From the remotest times Asia has been celebrated for its mineral wealth. In the Altai and Ural Mountains gold, iron, lead, and platinum are found; in India and other parts rubies, diamonds, and other gems are, or have been, procured; salt in Central Asia; coal in China, India, Central Asia, etc.; petroleum in the districts about the Caspian and in Burmah; bitumen in Syria; while silver, copper, sulphur, etc., are found in various parts.

Climate.—Every variety of climate may be experienced in Asia, but as a whole it is marked by extremes of heat and cold and by great dryness, this in particular being the case with vast regions in the center of the continent and distant from the sea. The great lowland region of Siberia has a short but very hot summer, and a long but intensely cold winter, the rivers and their estuaries being fast bound with ice, and at a certain depth the soil is hard frozen all the year round. The northern part of China to the east of Central Asia has a temperate climate with a warm summer, and in the extreme north a severe winter. The districts lying to the south of the central region, comprising the Indian and Indo-Chinese peninsulas, southern China, and the adjacent islands, present the characteristic climate and vegetation of the southern temperate and tropical regions modified by the effects of altitude. Some localities in Southeastern Asia have the heaviest rainfall anywhere known. As the equator is approached the extremes of temperature diminish till at the southern extremity of the continent they are such as may be experienced in any tropical country. Among climatic features are the monsoons of the Indian Ocean and the eastern seas, and the cyclones or typhoons, which are often very destructive.

Vegetation.—The plants and animals of Northern and Western Asia generally resemble those of similar latitudes in Europe (which is really a prolongation of the Asiatic continent), differing more in species than in genera. The principal mountain trees are the pine, larch, and birch; the willow, alder, and poplar are found in lower grounds. In the central

Asia

region European species reach as far as the western and central Himalayas, but are rare in the eastern. They are here met by Chinese and Japanese forms. The lower slopes of the Himalayas are clothed almost exclusively with tropical forms. Higher up, between 4,000 and 10,000 feet, are found all the types of trees and plants that belong to the temperate zone, there being extensive forests of conifers. Here is the native home of the deodar cedar. The southeastern region, including India, the Eastern Peninsula, and China, with the islands, contains a vast variety of plants useful to man and having here their original habitat, such as the sugar-cane, rice, cotton, and indigo, pepper, cinnamon, cassia, clove, nutmeg, and cardamoms, banana, cocoa-nut, areca and sago palms; the mango and many other fruits, with plants producing a vast number of drugs, caoutchouc and gutta-percha. The forests of India and the Malay Peninsula contain oak, teak, sál, and other timber woods, besides bamboos, palms, sandal-wood, etc. The palmyra palm is characteristic of southern India; while the talipot palm flourishes on the western coast of Hindustan, Ceylon, and the Malay Peninsula. The cultivated plants of India and China include wheat, barley, rice, maize, millet, sorghum, tea, coffee, indigo, cotton, jute, opium, tobacco, etc. In north China and the Japanese islands large numbers of deciduous trees occur, such as oaks, maples, limes, walnuts, poplars, and willows, the genera being European, but the individual species Asiatic. Among cultivated plants are wheat, and in favorable situations, rice, cotton, the vine, etc. Coffee, rice, maize, etc., are extensively grown in some of the islands of the Asiatic Archipelago. In Arabia and the warmer valleys of Persia, Afghanistan, and Beluchistan, aromatic shrubs are abundant. Over large parts of these regions the date-palm flourishes and affords a valuable article of food. Gum-producing acacias are, with the date-palm, the commonest trees in Arabia. African forms are found extending from the Sahara along the desert region of Asia.

Zoology.—Nearly all the mammals of Europe occur in Northern Asia, with numerous additions to the species. Central Asia is the native land of the horse, the ass, the ox, the sheep, and the goat. Both varieties of the camel, the single and the double humped, are Asiatic. To the inhabitants of Thibet and the higher plateaus of the Himalayas the yak is what the reindeer is to the tribes of the Siberian plain, almost their sole wealth and support. The elephant, of a different species from that of Africa, is a native of tropical Asia. The Asiatic lion, which inhabits Arabia, Persia, Asia Minor, Beluchistan, and some parts of India, is smaller than the African species. Bears are found in all parts, the white bear in the far north, and other species in the more temperate and tropical parts. The tiger is the most characteristic of the larger Asiatic carnivora. It extends from Armenia across the entire continent, being absent, however, from

Asia

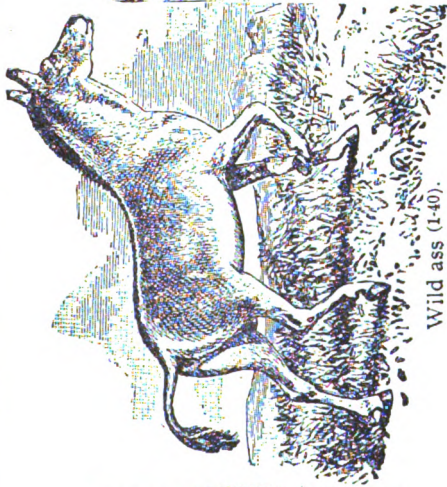
the greater portion of Siberia and from the high table-land of Tibet; it extends also into Sumatra, Java, and Bali. In Southeastern Asia and the islands we find the rhinoceros, buffalo, ox, deer, squirrels, porcupines, etc. In birds nearly every order is represented. Among the most interesting forms are the hornbills, the peacock, the Impey pheasant, the tragopan or horned pheasant, and other gallinaceous birds, the pheasant family being very characteristic of Southeastern Asia. It was from Asia that the common domestic fowl was introduced into Europe. The tropical parts of Asia abound in monkeys, of which the species are numerous. Some are tailed, others, such as the orang, are tailless, but none have prehensile tails like the American monkeys. In the Malay Archipelago marsupial animals, so characteristic of Australia, first occur in the Moluccas, and Celebes, while various mammals common in the western part of the Archipelago are absent. A similar transition toward the Australian type takes place in the species of birds. Of marine mammals the dugong is peculiar to the Indian Ocean; in the Ganges is found a peculiar species of dolphin. At the head of the reptiles stands the Gangetic crocodile, frequenting the Ganges and other large rivers. Among the serpents are the cobra da capello, one of the most deadly snakes in existence; there are also large boas and pythons, besides sea and freshwater snakes. The seas and rivers produce a great variety of fish. The Salmonidæ are found in the rivers flowing into the Arctic Ocean. Two rather remarkable fishes are the climbing perch and the archer-fish. The well-known goldfish is a native of China.

Population.—Asia is mainly peopled by races belonging to two great ethnographic types, the Caucasian or fair type, and the Mongolic or yellow. To the former belong the Aryan or Indo-European, and the Semitic races, both of which mainly inhabit the southwest of the continent; to the latter belong the Malays and Indo-Chinese in the southeast, as well as the Mongolians proper (Chinese, etc.), occupying nearly all the rest of the continent. To these may be added certain races of doubtful affinities, as the Dravidians of southern India, the Cingalese of Ceylon, the Ainos of Yesso, and some negro-like tribes called Negritos, which inhabit Malacca and the interior of several of the islands of the Eastern Archipelago. The total population is estimated 1901 at about 830,558,000, or more than half that of the whole world.

History.—Asia is generally regarded as the cradle of the human race. It possesses the oldest historical documents, and next to the immediately contiguous kingdom of Egypt, the oldest historical monuments in the world. The Old Testament contains the oldest historical records which we have of any nation in the form of distinct narrative. The period at which Moses wrote was probably 1,500 or 1,600 years before the Christian era. His and the later Jewish writings confine themselves almost ex-



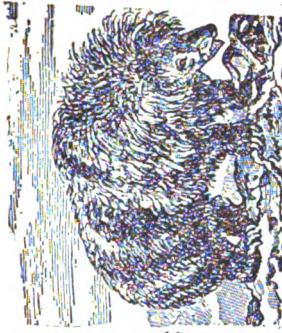
Bactrian camel (1-80).



Wild ass (1-40).



Babirusa (1-28).



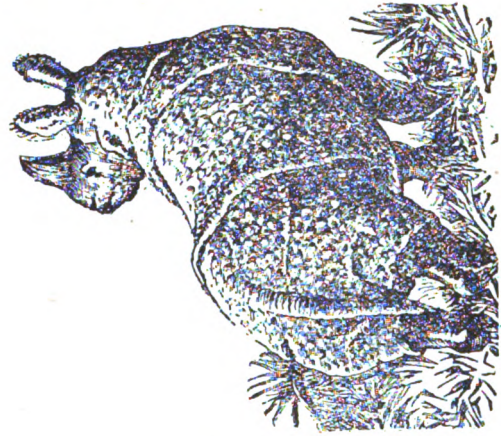
Sloth bear (1-24).



Argali (1-38).



Jungle fowl. Cassowary (1-48).



Rhinoceros (1-60).

Tapir (1-45).



Russian sable (1-9).



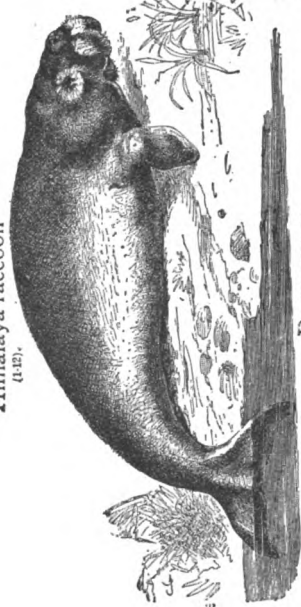
Himalaya raccoon (1-12).



Angora cat (1-10).



Marmot (1-9).



Dugong (1-20).



Whistling hare (1-7).



Elk (1-10).



Tiger (1-13).



Goat (1-27).

clusively to the history of the Hebrews; but in Babylonia, as in Egypt, civilization had made great advances long before this time. The earliest seat of the Aryan race was probably on the banks of the Oxus. Hence, perhaps from the pressure of the Mongolian tribes to the north, they spread themselves to the southeast and southwest, finally occupying northern India, Persia, and other parts of Western Asia, and spreading into Europe, perhaps about 2000-1500 B. C. In China authentic history extends back probably to about 1000 B. C., with a long preceding period of which the names of dynasties are preserved without chronological arrangement. The kingdoms of Assyria, Babylonia, Media, and Persia, alternately predominated in Southwestern Asia. In regard to the history of these monarchies much light has been obtained from the decipherment of the cuneiform inscriptions. The arms of the Pharaohs extended into Asia, but their conquests there were short-lived. From Cyrus (B. C. 559), who extended the empire of Persia from the Indus to the Mediterranean, while his son, Cambyses, added Egypt and Lybia to it, to the conquest of Alexander (B. C. 330), Persia was the dominant power in Western Asia. Alexander's great empire became broken up into separate kingdoms, which were finally absorbed in the Roman Empire, and this ultimately extended to the Tigris. Soon after the most civilized portions of the three continents had been reduced under one empire, the great event took place which forms the dividing line of history—the birth of Christ and the spread of Christianity. In A. D. 226 a protracted struggle began between the newer Persian Empire and the Romans, which lasted till the advent of Mohammed and the conquests of the Arabians. Persia was the first great conquest of Mohammed's followers. Syria and Egypt soon fell before their arms; and within forty years of the celebrated flight of Mohammed from Mecca (the *Hejira*), the sixth of the caliphs, or successors of the Prophet, was the most powerful sovereign of Asia. The Mongols next became the dominant race. In 999 Mahmud, whose father, born a Turkish slave, became governor of Ghazni, conquered India, and established his rule. The dynasty of the Seljuk Tatars was established in Aleppo, Damascus, Iconium, and Kharism, and was distinguished for its struggles with the Crusaders. Othman, an emir of the Seljuk sultan of Iconium, established the Ottoman Empire in 1300. About 1220 Genghis Khan, an independent Mongol chief, made himself master of Central Asia, conquered Northern China, overran Turkestan, Afghanistan, and Persia; his successors took Bagdad and extinguished the caliphate. In Asia Minor they overthrew the Seljuk dynasty. One of them, Timur or Tamerlane, carried fire and sword over Northern India and Western Asia, defeated and took prisoner Bajazet, the descendant of Othman (1402), and received tribute from the Greek emperor. The Ottoman Empire soon recovered from the blow inflicted by Timur, and Constantinople was taken and the Eastern Empire finally overthrown by

the Sultan Mohammed II in 1453. China recovered its independence about 1368 and was again subjected by the Manchu Tatars (1618-45), soon after which it began to extend its empire over Central Asia. Siberia was conquered by the Cossacks on behalf of Russia (1580-84). The same country effected a settlement in the Caucasus about 1786, and has since continued to make steady advances into Central Asia. The discovery by the Portuguese of the passage to India by the Cape of Good Hope led to their establishment on the coast of the peninsula (1498). They were speedily followed by the Spanish, Dutch, French, and British. The struggle between the two last powers for the supremacy of India was completed by the destruction of the French settlements (1760-65). France has recently acquired an extensive territory in Farther India. At present the forms of government in Asia range from the primitive rule of the nomad sheik to the despotism of China. India has been brought by Britain directly under European influence, and Japan is freely modeling her institutions on those of the West.

Asia, Central, a designation loosely given to the regions in the center of Asia east of the Caspian, also called Turkestan, and formerly Tartary. The eastern portion belongs to China, the western now to Russia. Russian Central Asia comprises the Kirghiz Steppe (Uralsk, Turgai, Akmolinsk, Semipalatinsk, etc.), and what is now the government-general of Turkestan, besides the territory of the Turkomans, or Transcaspians and Merv. Russia has thus absorbed the old khanate of Khokand and part of Bokhara and Khiva, and controls the vassal territories of Bokhara and Khiva, the southern boundary being the Persian and Afghan frontiers.

Asia Minor, the most westerly portion of Asia, being the peninsula lying W. of the Upper Euphrates, and forming part of Asiatic Turkey. It forms an extensive plateau, with lofty mountains rising above it, the most extensive ranges being the Taurus and Anti-Taurus, which border it on the S. and S.E., and rise to over 10,000 ft. There are numerous salt and fresh-water lakes. The chief rivers are the Kizil-Irmak (Halys), Sakaria (Sangarius), entering the Black Sea; and the Sarabat (Hermus) and Menderes (Mæander), entering the Ægean. The coast regions are generally fertile, and have a genial climate; the interior is largely arid and dreary. Valuable forests and fruit-trees abound. Smyrna is the chief town; *Anatolia* is an equivalent name.

Askabad', the administrative center of the Russian province of Transcaspians, situated in the Akhal Tekke oasis, and occupied by Skobeleff in January, 1881, after the sack of Geok Tepé. Its distance from Merv is 232 mi., from Herat 388 mi.

As'kew, ANNE (1521-1546), a victim of religious persecution. She was a daughter of Sir William Askew of Lincolnshire, and was married to a wealthy neighbor named Kyme, who, irritated by her Protestantism, drove her from

Asmannshausen

his house. In London she spoke against the dogmas of the old faith, and was condemned to death as a heretic.

As'mannshausen (-hou-zn), a Prussian village on the Rhine, in the district of Wiesbaden, celebrated for its wine. Many prefer the red wine of Asmannshausen to the best Burgundy, but it retains its merits for three or four years only.

Asnières (än-yär), a town on the Seine, of from 6,000 to 7,000 inhabitants, a favorite boating resort with the Parisians.

Asp (Aspic), a species of viper found in Egypt, resembling the cobra de capello or spectacle-serpent of the East Indies, and having a very venomous bite. When approached or disturbed it elevates its head and body, swells out its neck, and appears to stand erect to attack the aggressor. Hence the ancient Egyptians believed that the asps were guardians of the spots they inhabited, and the figure of this reptile was adopted as an emblem of the protecting genius of the world. The balancing motions made by it in the endeavor to maintain the erect attitude have led to the employment of the asp as a dancing serpent by the African jugglers. Cleopatra is said to have committed suicide by means of an asp's bite. The name asp is also given to a viper common on the continent of Europe.

Aspar'agus, a plant, the young shoots of which, cut as they are emerging from the ground, are a favorite culinary vegetable. In Greece, and especially in the southern *steppes* of Russia and Poland, it is found in profusion; and its edible qualities were esteemed by the ancients. It is mostly boiled and served with-



Asparagus. a—Upper end of stem, showing leaves.
b—Young shoot.

out admixture, and eaten with butter and salt. The plants should remain three years in the ground before they are cut; after which, for ten or twelve years, they will continue to afford a regular annual supply. The beds are protected by straw or litter in winter.

Asphalt

Aspa'sia, a celebrated lady of ancient Greece, b. at Miletus, in Ionia, but passed a great part of her life at Athens, where her house was the general resort of the most distinguished men in Greece. She won the affection of Pericles, who united himself to Aspasia as closely as was permitted by the Athenian law, which declared marriage with a foreign woman illegal. She had a son by Pericles, who was legitimated (B. C. 430) by a special decree of the people.

As'pen, or trembling poplar, a species of poplar indigenous to Britain and to most mountainous regions throughout Europe and Asia. It is a beautiful tree of rapid growth and extremely hardy, with nearly circular-toothed



Branch of Aspen. a—Catkin.

leaves, smooth on both sides, and attached to footstalks so long and slender as to be shaken by the slightest wind; wood, light, porous, soft, and of a white color, useful for various purposes.

Aspen, Pitkin co., Colo., situated on Castle Creek at an elevation of 7,700 ft. above the sea level, 60 mi. w. by s. of Leadville. It is in the center of a rich lead and silver mining country. Railroads: D. & R. G., and Colo. Midland. Pop. 1900, 3,309.

As'pern and Esslingen (es'ling-en), two villages east of Vienna, and on the opposite bank of the Danube; celebrated as the chief contested positions in the bloody but undecisive battle fought between the Archduke Charles and Napoleon I, May 21 and 22, 1809, when it was estimated that the Austrians lost a third of their army, and the French no less than half.

Asphalt, Asphalt'um, the most common variety of bitumen; also called mineral pitch. Asphalt is a compact, glossy, brittle, black or brown mineral, which breaks with a polished fracture, melts easily with a strong, pitchy odor when heated, and when pure burns without leaving any ashes. The largest natural deposit of asphalt is on the island of Trinidad, in the so-called Pitch Lake. Another asphalt lake occurs in Venezuela, and the product is known as the Bermudez asphalt. Asphalt is also found mixed with sand, or in sandstone or limestone, in Cuba, California, Utah, and various localities in Europe. It occurs in a liquid state on the surface of the Dead Sea in large quantity, and a fluid form,

Asphalt

known as mineral tar, is found in California. In the manufacture of coal-gas it is produced artificially. The most common use of asphalt is as a material for paving streets. The Trinidad asphalt is dug by means of picks, before daylight, when brittle, into buckets, and taken directly to the vessel for shipment. Crude asphaltum cannot be used in paving streets, but must be put through a refining process, which consists principally of a slow application of heat and precipitation. It takes three tons of the crude material to make two tons of refined asphalt. The first step in the refining process is to place the asphaltum in great tanks and melt it down. It is necessary that the material be stirred continually during this process. A certain proportion of the residuum of petroleum is put into the asphaltum to act as a flux and melt the substance at a lower temperature than it otherwise would melt; thus all of the oils in the asphaltum are saved. This mixture when done is called the "paving cement." While this process is going on, sharp, clean sand is being heated to about 300 degrees in large revolving drums. This sand is mixed in a certain proportion with the above mixture, to both of which is then added a certain proportion of carbonate of lime. The three substances are then mixed by means of a number of iron arms revolving at a very high speed. The whole mixture, known as a "street mixture," is then taken to the street to be laid as pavement.

Before the street is ready for the asphalt there must be done a certain amount of preliminary work. The street must be carefully graded to within eight or nine inches of the proposed finished surface. It is necessary that the sub-grade be very solid and rolled with a steam roller. Upon this foundation is laid a six-inch bed of hydraulic cement concrete, made of cement, clean, sharp sand, and broken stone. This, too, must be well rammed and rolled. Upon the efficiency of this preliminary work depends the value of the pavement when completed. The asphalt is usually laid on in two courses; the first, a cushion coat and then a surface coat. The asphalt "street mixture" is applied when it is at a temperature of about 250 or 300 degrees. The cushion coat is usually from one-half to one inch thick, and the surface coat is thick enough to make the entire sheet of asphalt two and one-half inches thick. The hot mixture is dumped into the street and spread evenly from curb to curb with hot rakes. Iron tampers and smoothers, also heated, smooth and finish the surface, which is then rolled with a hand-roller, then a five-ton, and last with a ten-ton roller. The surface coat is sprinkled with a small amount of hydraulic cement before the heavy rollers are passed over it.

Rock asphalt is mined by a simple process of blasting. It is abstracted from the rock by boiling in water. The rock asphalts when used for paving are not refined, but are simply crushed, reduced to powder by heat, and are then compressed in place. Aside from its use in paving, rock asphalt is also made into

Ass

asphaltic cement and mastic. Asphaltic cement is refined asphalt, tempered usually with petroleum. It is of medicinal value. Mastic is prepared by mixing asphaltic cement with sand or powdered limestone. Blocks of mastic, when melted, are used for floors, sidewalks and roofings. Asphalt concrete is simply crushed stone bound together with mastic and compressed. The deposits of asphalt in the United States are insufficient to meet the demand, and large quantities are imported, chiefly from Trinidad and Venezuela. These imports are rapidly increasing in volume.

Asphodel, a genus of plants, consisting of perennials, with fasciculated fleshy roots, flowers arranged in racemes, six stamens inserted at the base of the perianth, a sessile almost spherical ovary with two cells, each containing two ovules; fruit a capsule with three cells, in each of which there are, as a rule, two seeds. They are fine garden plants, native of Southern Europe. The king's spear has yellow flowers, blossoming in June. Another species, which attains a height of 5 ft., is cultivated in Algeria and elsewhere, its tubercles yielding a very pure alcohol, and the residue, together with the stalks and leaves, being used in making pasteboard and paper.

Asphyx'ia, literally, the state of a living animal in which no pulsation can be perceived, but the term is more particularly applied to a suspension of the vital functions from causes hindering respiration. The normal accompaniments of death from asphyxia are dark fluid blood, a congested brain and exceedingly congested lungs, the general engorgement of the viscera, and an absence of blood from the left cavities of the heart while the right cavities and pulmonary artery are gorged. The restoration of asphyxiated persons has been successfully accomplished at long periods after apparent death. The attempt should be made to maintain the heat of the body and to secure the inflation of the lungs as in the case of the apparently drowned.

As'pinwall. See *Colon*.

As'pirator, an instrument used to promote the flow of a gas from one vessel into another by means of a liquid. The simplest form of aspirator is a cylindrical vessel containing water, with a pipe at the upper end which communicates with the vessel containing the gas, and a pipe at the lower end also, with a stop-cock and with its extremity bent up. By allowing a portion of the water to run off by the pipe at the lower part of the aspirator, a measured quantity of air or other gas is sucked into the upper part.

Aspromon'te, a mountain of Italy in the s.w. of Calabria, where Garibaldi was wounded and taken prisoner with the greater part of his army, in August, 1862.

As'rael, the Mohammedan angel of death, who takes the soul from the body.

Ass, a species of the horse genus, supposed by Darwin to have sprung from the wild variety found in Abyssinia; by some writers to be a descendant of the *onager*, or wild ass, inhabiting the mountainous deserts of Tartary,

Assam

etc.; and by others to have descended from the kiang or djiggetai of s.w. Asia. Both in color and size the ass is exceedingly variable, ranging from dark gray and reddish brown to white, and from the size of a Newfoundland dog in North India to that of a good-sized horse. In the s.w. countries of Asia and in Egypt, in some districts of Southern Europe, as in Spain, and in Kentucky and Peru, great attention has been paid to selection and interbreeding, with a result no less remarkable than in the case of the horse. Thus in Syria there appear to be four distinct breeds: a light and graceful animal used by ladies, an Arab breed reserved for the saddle, an ass of heavier build in use for plowing and draft purposes, and the large Damascus breed. The male ass is mature at two years of age, the female still earlier. The teeth of the young ass follow the same order of appearance and renewal as those of the horse. The life of the ass does not usually exceed thirty years. It is in general much healthier than the horse, and is maintained in this condition by a smaller quantity and coarser quality of food; it is superior to the horse in its ability to carry heavy burdens over the most precipitous roads, and is in no respect its inferior in intelligence. The skin is used as parchment to cover drums, etc., and in the East is made into shagreen. The hybrid offspring of the horse and the female ass is the hinny, that of the ass and the mare is the mule; but the latter is by far the larger and more useful animal. Asses' milk, long celebrated for its sanative qualities, more closely resembles that of a woman than any other. It is very similar in taste, and throws up an equally fluid cream, which is not convertible into butter.

Assam, a chief province of British India; area 49,004 sq. mi. The climate is marked by great humidity, and malarious diseases are common in the low grounds; otherwise it is not unhealthy. The whole province, except the cultivated area, may be designated as forest, the trees including teak, sal, sissoo, the date and sago palm, the areca palm (the betel-nut tree), the Indian fig-tree, etc. The article of most commercial importance is tea, the yield of which is now over 60,000,000 lbs. annually. Other crops raised are rice, Indian corn, pulse, oil-seeds, sugar-cane, hemp, jute, potatoes, etc. In the jungles and forests roam herds of elephants, the rhinoceros, tiger, buffalo, leopard, bear, wild hog, jackal, fox, goat, and various kinds of deer. Among serpents are the python and the cobra. Pheasants, partridges, snipe, wild peacock, and many kinds of water-fowl abound. Coal, petroleum, and limestone are found in abundance, iron is smelted to a small extent, gold-dust is met with, lime is exported to Bengal. Pop 5,476,833, about 3,362,000 of whom are Hindus, 1,517,000 Mohammedans, 8,000 Christians. In 1826 Assam became a possession of Britain. The largest town is Sylhet (pop. 14,000).

Assassinations.—During the 19th century the following attempts upon the lives of rulers and high officials resulted fatally:

Assaying

Prince Daniel of Montenegro, killed, August 13, 1860.

President Lincoln, shot by John Wilkes Booth, April 14, 1865. He died a few hours later.

Prince Michael of Servia, killed, June 10, 1868.

Abdul Aziz, Sultan of Turkey, fatally stabbed June 16, 1876.

Alexander II, Czar of Russia, blown to pieces with dynamite, March 13, 1881.

President James A. Garfield, shot, July 2, 1881. Died September 19, 1881.

President Carnot of France, stabbed, June 24, 1884.

King Humbert of Italy, shot, July 29, 1900.

Prime Minister Canovas del Castillo of Spain, stabbed, August 8, 1897.

General Borda, President of Uruguay, killed, August 26, 1897.

President Barrios of Guatemala, killed, February 9, 1898.

Empress Elizabeth of Austria, stabbed, at Geneva, September 10, 1898.

President William McKinley, fatally shot, September 6, 1901. Died September 14, 1901, at the residence of John G. Milburn, Buffalo, N. Y.

Assass'ins, an Asiatic order or society having the practise of assassination as its most distinctive feature, founded by Hassan Ben Sabbah, a *dai* or missionary of the heterodox Mohammedan sect, the Ismaelites. The society grew rapidly in numbers, and in 1090 the Persian fortress of Alamut fell into their hands. Other territories were added, and the order became a recognized military power. Upon a select band fell the work of assassination, to which they were stimulated by the intoxicating influences of *hashish*. From the epithet *hashishim* (hemp-eaters) which was applied to the order, the European word *assassin* has been derived. Hassan, after a long and prosperous reign, died in 1124. Most of his successors died violent deaths at the hands of relatives or dependents. After withstanding the sultans Nouredin and Saladin, and making themselves feared by the Crusaders, the *Assassins* were overcome by the Tatar leader, Hulaku. The last chief, Rokneddin, was killed for an act of treachery subsequent to his capture, and his death was followed by a general massacre of the assassins, in which 12,000 perished.

Assaye (Assye) (as-si'), a village in Southern India, in Hyderabad, where Wellington gained a famous victory in 1803. The victory, however, cost him more than a third of his men.

Assaying, the estimation of the amount of pure metal, and especially of the precious metals, in an ore or alloy. In the case of silver the assay is either by the dry or by the wet process. The dry process is called *cupellation* from the use of a small and very porous cup, called a *cupel*, formed of well-burned and finely ground bone-ash made into a paste with water. The cupel, being thoroughly dried, is placed in a fire-clay oven about the size of a drain-tile, with a flat sole and arched roof, and with slits at the sides to admit air. This oven,

Assignats

called a *muffle*, is set in a furnace, and when it is at a red heat the assay, consisting of a small weighed portion of the alloy wrapped in sheet-lead, is laid upon the cupel. The heat causes the lead to volatilize or combine with the other metals, and to sink with them into the cupel, leaving a bright globule of pure metallic silver, which gives the amount of silver in the alloy operated on. In the wet process the alloy is dissolved in nitric acid, and to the solution are added measured quantities of a solution of common salt of known strength, which precipitates chloride of silver. The operation is concluded when no further precipitate is obtained on the addition of the salt solution, and the quantity of silver is calculated from the amount of salt solution used. An alloy of gold is first cupeled with lead as above, with the addition of three parts of silver for every one of gold. After the cupellation is finished, the alloy of gold and silver is beaten and rolled out into a thin plate, which is curled up by the fingers into a little spiral or *cornet*. This is put into a flask with nitric acid, which dissolves away the silver and leaves the cornet dark and brittle. After washing with water the cornet is boiled with stronger nitric acid to remove the last traces of silver, well washed, and then allowed to drop into a small crucible, in which it is heated, and then it is weighed. The assay of gold, therefore, consists of two parts: *cupellation*, by which inferior metals (except silver) are removed; and *quartation*, by which the added silver and any silver originally present are got rid of. The quantity of silver added has to be regulated to about three times that of the gold. If it be more the cornet breaks up, if it be less the gold protects small quantities of the silver from the action of the acid. Where, as in some gold-manufactured articles, these methods of assay cannot be applied, a streak is drawn with the article upon a *touchstone*, consisting of coarse-grained Lydian quartz saturated with bituminous matter, or of black basalt. The practised assayer will detect approximately the richness of the gold from the color of the streak.

Assignats (às-è-nya), the name of the national paper currency issued during the French Revolution. The notes were to be redeemed with the proceeds of the confiscated goods of the church. During 1790 and 1792 assignats were issued to the amount of \$9,115,600,000. They began immediately to depreciate in value, and in the spring of 1796 were worth only one three-hundred-and-thirty-fourth of their nominal value. This was due to the want of confidence in the government and to the ease with which they could be counterfeited. They were finally withdrawn from the currency and redeemed at one-thirtieth of their original value.

Assiniboi'a, a district in Canada, forming one of the Northwest Territories. Its land area is 89,535 square miles. Agriculture is the chief industry, and considerable wheat is raised. Regina, on the Canadian Pacific Railroad, is the capital of the district. See *North-west Territories*.

Assumpsit

Assiniboine, a river of Canada, which flows through Manitoba and joins the Red River at Winnipeg, about 40 mi. above the entrance of the latter into Lake Winnipeg, after a somewhat circuitous course of about 500 mi. from the west, and northwest. Steamers ply on it for over 300 mi.

Assisi (às-sē'sē), a small town in Italy, in the province of Umbria, 20 mi. n. of Spoleto, the see of a bishop, and famous as the birthplace of St. Francis d'Assisi. The splendid church built over the chapel where the saint received his first impulse to devotion, is one of the finest remains of mediæval Gothic architecture.

Associated Press, an association for the purpose of gathering news for daily papers. The Associated Press was organized in New York in 1848, and included the leading papers of that city. It is now the largest news-gathering organization in the world, and maintains representatives in all the leading cities and countries. Its most important centers in the United States are New York, Cincinnati, Chicago, St. Louis, New Orleans, and San Francisco. It has the country divided into four sections—the eastern, western, central, and southern. Each division has a central office and a superintendent. Reports are telegraphed to the central office, and from there to all members of the association in the division.

Association of Ideas, the term used in psychology to comprise the conditions under which one idea is able to recall another to consciousness. Recently some psychologists have been disposed to classify these conditions under two general heads; the law of contiguity, and the law of association. The first states the fact that actions, sensations, emotions, and ideas, which have occurred together, or in close succession, tend to suggest each other when any one of them is afterward presented to the mind. The second indicates that present actions, sensations, emotions, or ideas tend to recall their like from among previous experiences. Other laws have at times been enunciated, but they are reducible to these; thus, the "law of contrast or contrariety" is properly a case of contiguity. On their physical side the principles of association correspond with the physiological facts of re-excitation of the same nervous centres, and in this respect they have played an important part in the endeavor to place psychology upon a basis of positive science. The laws of association, taken in connection with the law of relativity, are held by many to be a complete exposition of the phenomena of intellect.

Assouan (às-sō-àn') (or Essouan), a town of Upper Egypt, on the east bank of the Nile, below the first cataract. The granite quarries of the Pharaohs, from which were procured the stones for the great obelisks and colossal statues of ancient times, are in the neighborhood. Pop. about 6,000; trade in dates, senna, etc.

Assump'sit, in common law, an action to recover compensation for the non-performance of a *parole* promise; that is, a promise not con-

Assyria

tained in a deed under seal. Assumpsits are of two kinds, *express* and *implied*. The former are where the contracts are actually made in word or writing; the latter are such as the law implies from the justice of the case; e. g., employment to do work implies a promise to pay.

Assyr'ia (the *Asshur* of the Hebrews, *Athura* of the ancient Persians), an ancient monarchy in Asia. Area about 100,000 sq. mi.; surface partly mountainous, hilly, or undulating, partly a portion of the fertile Mesopotamian plain. The numerous remains of ancient habitations show how thickly this vast flat must have once been peopled; now, for the most part, it is a mere wilderness. The chief cities of Assyria in the days of its prosperity were Nineveh, the site of which is marked by mounds opposite Mosul (Nebi Yunus and Koyunjik), Calah or Kalakh (the modern Nimrud), Asshur or Al Asur (Kalah Sherghat), Sargina (Khorsabad), and Arbela (Arbil).

Much light has been thrown on the history of Assyria by the decipherment of the cuneiform inscriptions obtained by excavation. The assertion of the Bible that the early inhabitants of Assyria went from Babylon is in conformity with the traditions of later times, and with inscriptions on the disinterred Assyrian monuments. For a long period the country was subject to governors appointed by the kings of Babylon, but about B. C. 1500 it became independent. About the end of the fourteenth century its king, Shalmaneser, is said to have founded the city of Kalakh (or Calah); his son, Tiglath-ninip, conquered the whole of the valley of the Euphrates. The five following reigns were chiefly occupied by wars with the Babylonians. About 1120 Tiglath-Pileser I, one of the greatest of the sovereigns of the first Assyrian monarchy, ascended the throne, and carried his conquests to the Mediterranean on the one side and to the Caspian and the Persian Gulf on the other. At his death there ensued a period of decline, which lasted over 200 years. Under Assurnazir-pal, who reigned from 884 to 859 B. C., Assyria once more advanced to the position of the leading power in the world, the extent of his kingdom being greater than that of Tiglath-Pileser. The magnificent palaces, temples, and other buildings of his reign prove the advance of the nation in wealth, art, and luxury. In 859 he was succeeded by his son Shalmaneser II, whose career of conquest was equally successful. He reduced Babylon to a state of vassalage, and came into hostile contact with Benhadad and Hazael of Damascus, and with Ahab and Jehu of Israel, from whom he exacted tribute, as also from the kings of Tyre and Sidon. The old dynasty came to an end in the person of Assurnirari II, who was driven from the throne by a usurper, Tiglath-Pileser, in 745, after a struggle of some years. No sooner was this able ruler firmly seated on the throne than he made an expedition into Babylonia, followed by another to the east in 744. A year later he defeated the confederate princes of Armenia, Syria, etc., and advancing against Syria, over-

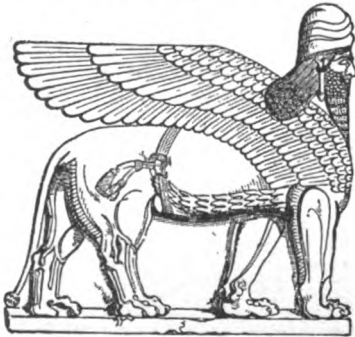
Assyria

threw the ancient kingdoms of Damascus and Hamath, and placed his vassal Hosea on the throne of Samaria. A protracted campaign in Media (737-735), another in Armenia, and the expedition into Syria mentioned in 2 Kings 16, are among the most important events of the latter years of his reign. Tiglath-Pileser carried the Assyrian arms from Lake Van on the north to the Persian Gulf on the south, and from the confines of India on the east to the Nile on the west. He was, however, driven from his throne by Shalmaneser IV (727), who blockaded Tyre for five years, invaded Israel, and besieged Samaria, but died before the city was reduced. His successor, Sargon (722-705), a usurper, claimed descent from the ancient Assyrian kings. After taking Samaria, he overthrew the combined forces of Elam (Susiana) and Babylon. The revolted Armenians had also more than once to be put down. In 710 Merodach-Baladan was driven out of Babylonia by Sargon, after holding it for twelve years as an independent king, and being supported by the rulers of Egypt and Palestine; his allies were also crushed, Judah was overrun, and Ashdod leveled to the ground. Sargon latterly crossed over and took Cyprus. He was murdered, being succeeded by Sennacherib, one of his younger sons, in 705. Sennacherib at once had to take up arms against Merodach-Baladan, who had again obtained possession of Babylon. He defeated Hezekiah and his Egyptian and Ethiopian allies, and forced him to pay tribute, after which he returned to Assyria to overawe the Babylonians, Elamites, and the northern hill tribes. In 681 he was murdered by his two sons, Adrammelech and Sharezer, but they were defeated by their brother, Esarhaddon, who then mounted the throne, fixed his residence at Babylon, and made it his capital. Egypt was reduced to a state of vassalage, the Ethiopian ruler, Tirhakah, being driven out and the land divided into twenty separate kingdoms. In 652 a general insurrection broke out, headed by Sammaghes, governor of Babylonia, and including Babylonia, Egypt, Palestine, and Arabia. Egypt was the only power, however, which regained its independence. Though the king's character was marked by cruelty and sensuality, he was a zealous patron of the arts and learning. He died in 625, and was succeeded by his son, Assur-emid-ilin (or Sarakos), under whom Babylon definitely threw off the Assyrian yoke. The capital, Nineveh, was captured and burned by the allied forces of the Medes and Babylonians, about 607 or 606 B. C. Assyria now fell partly to Media, partly to Babylonia, and afterward formed with Babylonia one of the satrapies of the Persian Empire. In 312 B. C. it became part of the kingdom of the Seleucidæ; later on it came under Parthian rule, and was more than once a Roman possession. For a long period it was under the caliphs of Bagdad. In 1638 the Turks wrested it from the Persians, and it has continued under their dominion since that date.

The original inhabitants of Assyria and

Assyria

Babylonia are known as Accadians (or Sumerians). They belonged to the Turanian or Ural-Altaic race, and were, therefore, of the same stock as that from which the Finns, Turks, and Magyars have descended. In early times a Semitic race of people spread themselves over the country, and mingled with or supplanted the original inhabitants, while their language took the place of the Accadian, the latter becoming a dead language. These later Assyrians were thus akin to the Hebrews, Phœnicians, and modern Arabians. Their language differed little from the Babylonian, and both retained traces of the influence of the earlier Accadian. Assyrian is closely allied to Hebrew and Phœnician, and changed little throughout the 1,500 years during which we can trace it in the inscriptions. It continued to be written with the cuneiform or arrowheaded character down to the third century B. C. The greater part of the Assyrian literature was stamped in minute characters on baked bricks, the subjects comprising hymns to the gods, mythological and epic poems, and works on history, chronology, astrology, law, etc. After Assur, the chief god, came twelve chief deities, including Anu, the father of the gods; Bel, the lord of the world; Hea, the lord of the sea; Sin, the moon-god; Shamas, the sun-god; Istar, a powerful goddess with various attributes; Ninip, god of hunting (the man-bull); Nergal, god of war (the man-



The God Nergal (British Museum).

lion); etc. A number of spirits, good and evil, presided over the minor operations of nature. There were set forms regulating the worship of all the gods and spirits, and prayers to each were inscribed on clay tablets with blanks for the names of the persons using them.

The Assyrians were far advanced in art and industry, and in civilization in general. They constructed large buildings, especially palaces of brick, burned or sun-dried, stone, alabaster slabs for lining and adorning the walls internally and externally, and timber for pillars and roofs. These alabaster slabs were elaborately sculptured with designs serving to throw much light on the manners and customs of the people. The palaces were raised on high terraces, and often comprised a great number of apartments; there were no windows, light being obtained by carrying the walls up to a

Assyriology

certain height and then raising on them pillars to support the roof and admit light and air. The Assyrian sculptures, as a rule, were in relief, figures in the full round being the exception. More than three quarters of the reliefs are of warlike scenes; hunting scenes are also favorite subjects. The vestiges of Assyrian painting consist chiefly of fragments of stucco and glazed tiles. In these, traces of Egyptian influence are to be found, but the Assyrian figure type is for the most part of a more voluptuous and vigorous fullness than the Egyptian. They understood and applied the arch; constructed tunnels, aqueducts, and drains; used the pulley, the lever, and the roller; engraved gems in a highly artistic way; understood the arts of inlaying, enameling, and overlaying with metals; manufactured porcelain, transparent and colored glass; were acquainted with the lens; and possessed vases, jars and other dishes, bronze and ivory ornaments, bells, gold earrings and bracelets of excellent design and workmanship. Their household furniture also gives a high idea of their skill and taste. The cities of Nineveh, Assur, and Arbela had each their royal observatories, superintended by astronomers-royal, who had to send in their reports to the king twice a month. At an early date the stars were numbered and named; a calendar was formed, in which the year was divided into twelve months (of thirty days each), called after the zodiacal signs; but as this division was found to be inaccurate an intercalary month was added every six years. The week was divided into seven days, the seventh being a day of rest; the day was divided into twelve periods of two hours each, each of these being subdivided into sixty minutes, and these again into sixty seconds. Eclipses were recorded from a very remote epoch, and their recurrence roughly determined. The principal astronomical work, called the *Illumination of Bel*, was inscribed on seventy tablets, and went through numerous editions, one of the latest being in the British Museum. It treats among other things of comets, the polar star, the conjunction of the sun and moon, and the motions of Venus and Mars.

Assyriology, the department of knowledge which deals with Assyrian antiquities and history, is entirely a modern study. Until 1842 the materials for Assyrian history were derived from the Jewish records of the Old Testament and from such comparatively late writers as Herodotus and Ctesias. In 1843-46 M. Botta, the French consul at Mosul, made the first explorations at Koyunjik and Khorsabad, and the objects thus obtained were transported to the Louvre. In 1845 and in 1849 valuable researches were conducted by Mr. Layard, and subsequently continued by the British Museum trustees. Later researches were instituted by the proprietors of the *Daily Telegraph*, and then by the government, in which Mr. George Smith met with considerable success. More recently Mr. Rassam has carried on the work of discovery. In the de-

Astarte

cipherment and translation of the cuneiform inscriptions among the most distinguished names are those of Sir Henry Rawlinson, Mr. H. Fox Talbot, Mr. George Smith, M. Jules Oppert, Dr. Schrader, Dr. Hincks, Rev. A. H. Sayce, Mr. Le Page Renouf, Prof. Terrien de la Couperie, Mr. Boscawen, and Mr. Pinches.

Astar'te, a Syrian goddess, probably corresponding to the *Semele* of the Greeks and the *Ashtaroth* of the Hebrews, and representing the productive power of nature. She was a moon-goddess. Some regard her as corresponding with *Hera* (*Juno*), and others with *Aphrodite*.

As'ter, a genus of plants, comprehending several hundred species, mostly natives of North America, although others are widely distributed. Many are cultivated as ornamental plants. Asters generally flower late in the season, and some are hence called Michaelmas or Christmas Daisies. The China Aster is a very showy annual, of which there are many varieties.

Aste'ria, a name applied to a variety of corundum, which displays an opalescent star of six rays of light when cut with certain precautions; and also to the *cat's-eye*, which consists of quartz, and is found especially in Ceylon.

As'teroids (or Planetoids), a numerous group of very small planets revolving round the sun between the orbits of Mars and Jupiter, remarkable for the eccentricity of their orbits and the large size of their angle of inclination to the ecliptic. The diameter of the largest is not supposed to exceed 450 mi., while most of the others are very much smaller. They number over 270, and new members are being constantly discovered. Ceres, the first of them, was discovered Jan. 1, 1801, and within three years more Pallas, Juno, and Vesta were seen. The extraordinary smallness of these bodies, and their nearness to each other, gave rise to the opinion that they were but the fragments of a planet that had formerly existed and had been brought to an end by some catastrophe. For nearly forty years investigations were carried on, but no more planets were discovered till Dec. 8, 1845, when a fifth planet in the same region was discovered. The rapid succession of discoveries that followed was for a time taken as a corroboration of the disruptive theory, but the breadth of the zone occupied makes the hypothesis of a shattered planet more than doubtful. Their mean distances from the sun vary between 200,000,000 and 300,000,000 mi.; the periods of revolution, between 1,191 days (Flora) and 2,868 (Hilda). Their eccentricities and inclinations are on the average greater than those of the earth, but their total mass does not exceed one fourth that of the earth.

Asthma (ast'ma), difficulty of respiration returning at intervals, with a sense of stricture across the chest and in the lungs, a wheezing, hard cough at first, but more free toward the close of each paroxysm, with a discharge of mucus, followed by a remission. Asthma is essentially a spasm of the muscular

Astoria

tissue which is contained in the smaller bronchial tubes. It generally attacks persons advanced in years, and seems, in some instances, to be hereditary. The exciting causes are various—accumulation of blood or viscid mucus in the lungs, noxious vapors, a cold and foggy atmosphere, or a close, hot air, flatulence, accumulated feces, violent passions, organic diseases in the thoracic viscera, etc. By far the most important part of the treatment consists in the obviating or removing the several exciting causes. It seldom proves fatal except as inducing dropsy, consumption, etc.

Asti (ás'tē), a town of Northern Italy, province of Alessandria, 28 mi. e.s.e. of Turin. In the Middle Ages it was one of the most powerful republics of Northern Italy. It was the birthplace of Alfieri, the poet, whose statue adorns the principal square. A favorite wine is produced in the neighborhood. Pop. 17,340.

Astig'matism, a malformation, congenital or accidental, of the lens of the eye, in consequence of which the individual does not see objects in the same plane, although they may really be so. It is due to the degree of convexity of the horizontal and vertical meridians being different, so that corresponding rays, instead of converging into one point, meet at two foci.

Astor, JOHN JACOB (1763–1848), an American capitalist, b. near Heidelberg, Germany; d. at New York. In 1783 he emigrated to the U. S., settled at New York, and became extensively engaged in the fur trade. In 1811 the settlement of Astoria, founded by him, near the mouth of the Columbia River, was formed to serve as a central depot for the fur trade between the lakes and the Pacific. He subsequently engaged in various speculations, and died worth \$20,000,000, leaving \$400,000 to found the Astor Library in New York. This institution is contained in a splendid building, enlarged in 1859 at the cost of his son, and comprises about 260,000 volumes. His descendants are the principal ground landlords of the city of New York.

Astor, WILLIAM (1792–1875), son of John Jacob Astor, carried on the enormous business interests of his father and is said to have left \$50,000,000. He added \$200,000 to his father's bequest for a public library. He was known as the *landlord of New York*, from the extent of his property in that city.

Astor, WILLIAM WALDORF, b. 1848, son of J. J. Astor. Elected to state legislature, 1877, and to state senate in 1879. Was envoy and minister plenipotentiary to Italy, 1882–85. He inherited the greater part of the enormous Astor estate in 1890. He is now living in England.

Astoria, county seat of Clatsop county, Oregon, situated at the mouth of the Columbia river, 70 miles north of Portland. It has a good harbor and railway facilities. Industries: salmon canning, lumber trade, and manufactures of clothing, furniture, machinery and pottery. Astoria was settled in 1811 and named for John Jacob Astor. It was the first settlement on the Columbia. Pop. 1900, 8,381.

Astræ'a, in Greek mythology, the daughter of Zeus and Themis, and goddess of justice. During the Golden Age she dwelt on earth, but on that age passing away she withdrew from the society of men and was placed among the stars, where she forms the constellation Virgo. The name was given to one of the asteroids, discovered in 1845. It revolves around the sun in 1,511.10 solar days, and is about $2\frac{1}{2}$ times the distance of the earth from the sun.

Astrag'alus, the upper bone of the foot supporting the tibia; the huckle, ankle, or sling bone. It is a strong, irregularly shaped bone, and is connected with the others by powerful ligaments.

Astrakhan (äs-trä-zän'), a Russian city, capital of government of same name. The manufactures are large and increasing, and the fisheries (sturgeon, etc.) very important. It is the chief port of the Caspian, and has regular steam communication with the principal towns on its shores. Pop. 57,704, composed of various races. The government has an area of 85,000 sq. mi. It consists almost entirely of two vast *steppes*, separated from each other by the Volga, and forming for the most part arid sterile deserts. Pop. 766,840.

Astrakhan, a name given to sheep-skins with a curled, woolly surface obtained from a variety of sheep found in Bokhara, Persia, and Syria; also a rough fabric with a pile in imitation of this.

Astrin'gent, a medicine which contracts the organic textures and canals of the body, thereby checking or diminishing excessive discharges. The chief astringents are the mineral acids, alum, lime-water, chalk, salts of copper, zinc, iron, lead, silver; and among vegetables, catechu, kino, oak-bark, and galls.

Astrol'ogy, literally, the science or doctrine of the stars. The name was formerly used as equivalent to astronomy, but is now restricted in meaning to the pseudo-science which pretends to enable men to judge of the effects and influences of the heavenly bodies on human and other mundane affairs, and to foretell future events by their situations and conjunctions. As usually practised the whole heavens, visible and invisible, was divided by great circles into twelve equal parts, called *houses*. As the circles were supposed to remain immovable every heavenly body passed through each of the twelve houses every twenty-four hours. The portion of the zodiac contained in each house was the part to which chief attention was paid, and the position of any planet was settled by its distance from the boundary circle of the house, measured on the ecliptic. The houses had different names and different powers, the first being called the house of life, the second the house of riches, the third of brethren, the sixth of marriage, the eighth of death, and so on. The part of the heavens about to rise was called the *ascendant*, the planet within the house of the ascendant being *lord of the ascendant*. The different *aspects* of the planets were of great importance. To *cast a person's nativity* (or *draw his horoscope*) was to find the position of the heavens at the in-

stant of his birth, which being done, the astrologer, who knew the various powers and influences possessed by the sun, the moon, and the planets, could predict what the course and termination of that person's life would be. The temperament of the individual was ascribed to the planet under which he was born, as *saturnine* from *Saturn*, *jovial* from *Jupiter*, *mercurial* from Mercury, etc., words which are now used with little thought of their original meaning. The virtues of herbs, gems, and medicines were supposed to be due to their ruling planets.

Astron'omy is that science which investigates the motions, distances, magnitudes, and various phenomena of the heavenly bodies. That part of the science which gives a description of the motions, figures, periods of revolution, and other phenomena of the heavenly bodies is called *descriptive astronomy*; that part which teaches how to observe the motions, figures, periodical revolutions, distances, etc., of the heavenly bodies, and how to use the necessary instruments, is called *practical astronomy*; and that part which explains the causes of their motions, and demonstrates the laws by which those causes operate, is termed *physical astronomy*. Recent years have added two new fields of investigation which are full of promise for the advancement of astronomical science. The first of these—*celestial photography*—has furnished us with invaluable light-pictures of the sun, moon, and other bodies, and has recorded the existence of myriads of stars invisible even by the best telescopes; while the second, *spectrum analysis*, reveals to us a knowledge of the physical constituents of the universe, telling us for instance that in the sun (or his atmosphere) there exist many of the elements familiar to us on the earth. It has also been applied to the determination of the velocity with which stars are approaching to, or receding from, our system; and to the measurement of movements taking place within the solar atmospheric envelopes. From analysis of some of the unresolved nebulae the inference is drawn that they are not star-swarms but simply cosmical vapor; whence a second inference results favorable to the hypothesis of the gradual condensation of nebulae, and the successive evolutions of suns and systems.

The most remote period to which we can go back in tracing the history of astronomy refers us to a time about 2500 B. C., when the Chinese are said to have recorded the simultaneous conjunction of Saturn, Jupiter, Mars, and Mercury with the moon. This remarkable phenomenon is found, by calculating backward, to have taken place 2460 B. C. Astronomy has also an undoubtedly high antiquity in India. The mean annual motion of Jupiter and Saturn was observed as early as 3062 years B. C.; tables of the sun, moon, and planets were formed, and eclipses calculated. In the time of Alexander the Great, the Chaldeans or Babylonians had carried on astronomical observations for 1,900 years. They regarded comets as bodies traveling in extended orbits,

and predicted their return; and there is reason to believe that they were acquainted with the true system of the universe. The priests of Egypt gave astronomy a religious character; but their knowledge of the science is testified to only by their ancient zodiacs and the position of their pyramids with relation to the cardinal points. It was among the Greeks that astronomy took a more scientific form. Thales of Miletus (b. 639 B. C.) predicted a solar eclipse, and his successors held opinions which are in many respects wonderfully in accordance with modern ideas. Pythagoras (500 B. C.) promulgated the theory that the sun is the center of the planetary system. Great progress was made in astronomy under the Ptolemies, and we find Timochares and Aristyllus employed about 300 B. C. in making useful planetary observations. But Ptolemy of Samos (b. 267 B. C.) is said, on the authority of Archimedes, to have far surpassed them, by teaching the double motion of the earth around its axis and around the sun. A hundred years later Hipparchus determined more exactly the length of the solar year, the eccentricity of the ecliptic, the precession of the equinoxes, and even undertook a catalogue of the stars. It was in the second century after Christ that Claudius Ptolemy, a famous mathematician of Pelusium in Egypt, propounded the system that bears his name; viz., that the earth was the center of the universe, and that the sun, moon, and planets revolved around it in the following order: nearest to the earth was the sphere of the moon; then followed the spheres of Mercury, Venus, the Sun, Mars, Jupiter, and Saturn; then came the sphere of the fixed stars; these were succeeded by two *crystalline* spheres and an outer sphere named the *primum mobile* or first motion, which last was again circumscribed by the *calum empyreum*, of a cubic shape, wherein happy souls found their abode. The Arabs began to make scientific astronomical observations about the middle of the eighth century, and for 400 years they prosecuted the science with assiduity. Ibn-Yunis (1000 A. D.) made important observations of the disturbances and eccentricities of Jupiter and Saturn. In the sixteenth century Nicholas Copernicus, b. in 1473, introduced the system that bears his name, and which gives to the sun the central place in the solar system, and shows all the other bodies, the earth included, revolving around him. This arrangement of the universe came at length to be generally received on account of the simplicity it substituted for the complexities and contradictions of the theory of Ptolemy. The observations and calculations of Tycho Brahe, a Danish astronomer, b. in 1546, continued over many years, were of the highest value, and claim for him the title of regenerator of practical astronomy. His assistant and pupil, Kepler, b. in 1571, was enabled, principally by the aid he received from his master's labors, to arrive at those laws which have made his name famous: 1, That the planets move, not in circular, but in elliptical orbits, of which the sun occupies a focus. 2, That

the radius vector, or imaginary straight line joining the sun and any planet, moves over equal spaces in equal times. 3, That the squares of the times of the revolutions of the planets are as the cubes of their mean distances from the sun. Galileo, who died in 1642, advanced the science by his observations and by the new revelations he made through his telescopes, which established the truth of the Copernican theory. Newton, b. in 1642, carried physical astronomy suddenly to comparative perfection. Accepting Kepler's laws as a statement of the facts of planetary motion he deduced from them his theory of gravitation. The science was enriched toward the close of the eighteenth century by the discovery by Herschel of the planet Uranus and its satellites, the resolution of the Milky Way into myriads of stars, and the unraveling of the mystery of nebulae and of double and triple stars. The splendid analytical researches of Lalande, Lagrange, Delambre, and Laplace mark the same period. The nineteenth century opened with the discovery of the first four minor planets; and the existence of another planet (Neptune) more distant from the sun than Uranus, was, in 1845, simultaneously and independently predicted by Leverrier and Adams. Of late years the sun has attracted a number of observers, the spectroscope and photography having been especially fruitful in this field of investigation. From recent transit observations the former calculated distance of the sun has been corrected, and is now given as 92,560,000 mi. An interesting recent discovery is that of the two satellites of Mars. The existence of an intra-Mercurial planet, which has been named Vulcan, has not yet been verified. Much valuable work has of late been accomplished in ascertaining the parallax of fixed stars.

The objects with which astronomy has chiefly to deal are the earth, the sun, the moon, the planets, the fixed stars, comets, nebulae, and meteors. The stellar universe is composed of an unknown host of stars, many millions in number, the most noticeable of which have been formed into groups called *constellations*. The nebulae are cloud-like patches of light scattered all over the heavens. Some of them have been resolved into star-clusters, but many of them are but masses of incandescent gas. A favorite theory regarding the fixed stars is that they form a system to which our sun belongs, and that many of the nebulae are similar systems situated far outside of our own. The fixed stars preserve, at least to unaided vision, an unalterable relation to each other, because of their vast distance from the earth. Their apparent movement from east to west is the result of the earth's revolution on its axis in twenty-four hours from west to east. The planets have not only an apparent, but also a real and proper motion, since, like our earth, they revolve around the sun in their several orbits and periods. The nearest of these bodies to the sun—unless the hypothetical *Vulcan* really exists—is *Mercury*. *Venus*, the second planet from the sun, is the bright-

Asturia

est and most beautiful of all the planets. The *Earth* is the first planet accompanied by a satellite or moon. *Mars*, the next planet, has two satellites, as already mentioned. Its surface has a variegated character, and the existence of land, water, snow, and ice has been assumed. The *Asteroids*, of which over 270 have been observed, form a broad zone of small bodies circulating in the space between Mars and Jupiter. *Jupiter*, the largest planet of the system, has four satellites, discovered by Galileo, and is marked by dark bands or belts on each side of the equator. *Saturn*, with his eight moons, and his broad thin rings with edges turned toward the planet, is, perhaps, the most striking telescopic object in the heavens. *Uranus*—discovered by Herschel in 1781—is accompanied by four satellites. *Neptune*, the farthest removed from the sun, has one satellite, the motion of which is retrograde. Besides the planets, quite a number of comets are known to be members of the solar system. The physical constitution of these bodies is still one of the enigmas of astronomy. The observation of meteors has recently attracted much attention. They most frequently occur in the autumn, and have been supposed to be the debris of comets. See articles, *Earth*, *Sun*, *Moon*, *Planet*, *Comet*, *Stars*, *Mercury*, *Venus*, *Mars*, *Jupiter*, *Saturn*, *Asteroids*.

Astu'ria (or The Asturias), a Spanish principality, now forming the province of Oviedo, on the north coast of Spain; an Alpine region, with steep and jagged mountain ridges, valuable minerals, luxuriant grazing lands, and fertile, well-watered valleys. The hereditary prince of Spain has borne since 1388 the title of Prince of the Asturias.

Asty'ages (-jéz), the last king of the Medes, (593-558 B.C.), deposed by Cyrus, an event which transferred the supremacy from the Medes to the Persians.

Asuncion (ä-söön'sö-ön) (or Nuestra Señora de la Asuncion), the chief city of Paraguay. It was founded in 1536 on the feast of the Assumption. Its trade is mostly in the yerba tea, hides, tobacco, oranges, etc. It was taken and plundered by the Brazilians in 1869, and some of the leading buildings still remain in a half-ruined condition. A railway runs for a short distance into the interior. Pop. 24,838.

Atacama (ä-tä-kä'mä), a desert region on the west coast of South America belonging to Chile. It forms the chief mining district of Chile, there being here rich silver mines, while gold is also found as well as argentiferous lead, copper, nickel, cobalt, and iron; with guano on the coast. The northern portion, till recently, belonged to Bolivia. The Chilean prov. of Atacama has an area of 43,180 sq. mi., and a pop. of 66,067.

Ataca'mite, a mineral consisting of a combination of the protoxide and chloride of copper, occurring abundantly in some parts of South America, as at Atacama, whence it has its name. It is worked as an ore in South America, and is exported to England.

Atahual'pa, the last of the Incas, succeeded

Athaliah

his father in 1529 on the throne of Quito, while his brother Huascar obtained the kingdom of Peru. They soon made war against each other, when the latter was defeated, and his kingdom fell into the hands of Atahualpa. The Spaniards, with Pizarro at their head, invaded Peru, and advanced to Atahualpa's camp. Atahualpa was captured, and despite the payment of a vast ransom in gold, was executed (1533).

Atalan'ta, in the Greek mythology, a famous huntress of Arcadia. She was to be obtained in marriage only by him who could outstrip her in a race, the consequence of failure being death. One of her suitors obtained from Aphrodite (Venus) three golden apples, which he threw behind him, one after another, as he ran. Atalanta stopped to pick them up, and was not unwillingly defeated. There was another Atalanta belonging to Boeotia, who cannot very well be distinguished, the same stories being told about both.

Ataxy (Ataxia), in medicine, irregularity in the animal functions, or in the symptoms of a disease. See *Locomotor ataxy*.

Atchafalay'a ("Lost Water"), a river of the U. S., an outlet of the Red River which strikes off before the junction of that river with the Mississippi, flows southward, and enters the Gulf of Mexico by Atchafalaya Bay. Its length is 250 mi.

Atchison, county seat of Atchison county, Kansas, 49 miles northwest of Kansas City, Mo. Railroads: Missouri Pacific, C., R. I. & P.; A. T. & S. F., C. B. & Q., and several other trunk lines. Industries: grain elevators, railroad shops, foundries and machine shops, lumber mills, furniture factories, harness and broom factories and brick yards. The town has an extensive trade in live stock, produce and fruit, and ranks as one of the leading commercial centers of the state. Seat of the State Soldiers' Orphans' Home and several denominational schools of importance. Pop. 1900, 15,722.

Athabas'ca, a river, lake, and district of Canada. LAKE ATHABASCA, or Lake of the Hills, is about 190 mi. s.s.e. of the Great Slave Lake, with which it is connected by means of the Slave River, a continuation of the Peace. It is about 200 mi. in length from east to west, and about 35 mi. wide at the broadest part, but gradually narrows to a point at either extremity. The district of ATHABASCA, formed in 1882, lies immediately e. of British Columbia, and n. of Alberta. Area about 122,000 sq. mi. It is intersected by the Athabaska and the Peace Rivers, and as yet has a scanty population. The name is also given to a family of Indians.

Athali'ah, daughter of Ahab, king of Israel, and wife of Joram, king of Judah. After the death of her son Ahaziah, she opened her way to the throne by the murder of forty-two princes of the royal blood. She reigned six years; in the seventh the high priest Jehoiada placed Joash, the young son

Athelney

of Abaziah, who had been secretly preserved, on the throne of his father, and Athaliah was slain. See 2 Kings 8:9, 11.

Athelney, formerly an island in the midst of fens and marshes, now drained and cultivated, in Somersetshire, England, about 7 mi. s.e. of Bridgewater. Alfred the Great took refuge in it during a Danish invasion, and afterward founded an abbey there.

Athelstan, King of England, b. 895, d. 941, succeeded his father, Edward the Elder, in 925. He was victorious in his wars with the Danes of Northumberland and the Scots, by whom they were assisted. After a single overthrow of his enemies at Brunanburgh he governed in peace and with great ability.

Athēna (or Athēnē), a Greek goddess, the representative of the intellectual powers; the daughter of Zeus (Jupiter) and Mētis. According to the legend, before her birth Zeus swallowed her mother, and Athena afterward sprang from the head of Zeus. She slew Pallas and Enceladus. In all representations she is the symbol of the thinking faculty, the goddess of wisdom, science, and art. As a warrior she is represented completely armed, her head covered with a gold helmet. As the goddess of peaceful arts she appears in the dress of a Grecian matron. To her insignia belong the *Ægis*, the Gorgon's head, the round Argive buckler. All Attica, but particularly Athens, was sacred to her, and she had numerous temples there.

Athenaeum, the temple of Athena (or Minerva), at Athens, frequented by poets, learned men, and orators. The same name was given at Rome to the school which Hadrian established on the Capitoline Mount for the promotion of literary and scientific studies. In modern times the same name is given to literary clubs and establishments connected with the sciences.

Athens, anciently the capital of Attica and center of Greek culture, now the capital of the kingdom of Greece. It is situated in the central plain of Attica, about 4 miles from the Saronic Gulf (or Gulf of *Ægina*), an arm of the *Ægean* Sea running in between the mainland and the Peloponnesus. It is said to have been founded about 1550 B.C. by Cecrops, the mythical Pelasgian hero, and to have borne the name Cecropia until under Erechtheus it received the name of Athens in honor of Athēnē. The Acropolis, an irregular oval crag 150 ft. high, with a level summit 1,000 ft. long by 500 in breadth, was the original nucleus of the city. The three chief eminences near the Acropolis—the Areopagus to the northwest, the Pnyx to the southwest, and the Museum to the south of the Pnyx—were thus included within the city boundary as the sites of its chief public buildings. On the east ran the Ilissus and on the west the Cephissus, while to the southwest lay three harbors, Phalerum, the Piræus, and Munychia. At the height of its prosperity the city was connected with its harbors by three massive walls. The architectural development of Athens may be dated from the rule of the Pisistratides (560-510 B.C.), who are

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credited with the foundation of the temple of the Olympian Zeus, completed by Hadrian seven centuries later, the erection of the Pythium and of the Lyceum; also the Academy and the building of the Agora, Senate-house, Tholus, and Prytanium. With the foundation of Athenian democracy under Clisthenes, the Pnyx or place of public assembly, with its semicircular area and cyclopean wall, first became of importance, and a commencement was made to the Dionysiac theater (theater of Dionysus, or Bacchus) on the south side of the Acropolis. After the destruction wrought by the Persians in 480 B.C., Themistocles reconstructed the city upon practical lines and with a larger area, enclosing the city in new walls $7\frac{1}{2}$ miles in circumference, erecting the north wall of the Acropolis, and developing the maritime resources of the Piræus; while Cimon added to the southern fortifications of the Acropolis, planted the Agora with trees, laid out the Academy, and built the Theseum. Under Pericles the highest point of artistic development was reached. An Odeium was erected on the east of the Dionysiac theater for the recitations of rhapsodists and musicians; and with the aid of the architects, Ictinus and Mnesicles, and of the sculptor Phidias, the Acropolis was perfected. Covering the whole of the western end rose the Propylæa, of Pentelic marble and consisting of a central portico with two wings in the form of Doric temples. In the interval between the close of the Peloponnesian war and the battle of Chæronea few additions were made. Then, however, the long walls and Piræus, destroyed by Lysander, were restored by Conon, and under the orator Lycurgus the Dionysiac temple was completed. The Panathenaic stadium commenced, and the choragic monuments of Lysicrates and Thrasylus erected. Later on Ptolemy Philadelphus gave it the Ptolemæum near the Theseum, Attalus I, the stoa northeast of the Agora. Eumenes II, that near the great theater, and Antiochus Epiphanes carried on the Olympium. Under the Romans it continued a flourishing city, Hadrian in the second century adorning it with many new buildings. But after a time Christian zeal, the attacks of barbarians, and robberies of collectors made sad inroads among the monuments. About 420 A.D. paganism was totally annihilated at Athens, and when Justinian closed even the schools of the philosophers, the reverence for buildings associated with the names of the ancient deities and heroes was lost. The Parthenon was turned into a church of the Virgin Mary, and St. George stepped into the place of Theseus. Finally, in 1456, the place fell into the hands of the Turks. The Parthenon became a mosque, and in 1687 was greatly damaged by an explosion at the siege of Athens by the Venetians. Enough, however, remains of it and of the neighboring structures to abundantly attest the splendor of the Acropolis; while of the other buildings of the city, the Theseum and Horologium, or Temple of the Winds, are admirably preserved, as also are the Pnyx, Panathenaic stadium, etc. Soon after the

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commencement of the war of liberation in 1821, the Turks surrendered Athens, but captured it again in 1826-27. It was then abandoned until 1830. In 1835 it became the royal residence, and made rapid progress. The modern city mostly lies northward and eastward from the Acropolis. Among the principal buildings are the royal palace, the university, the academy, public library, theater, and observatory. The university was opened in 1836, and has 1,400 students. There are valuable museums, in particular the National Museum and that in the Polytechnic School. These are constantly being added to by excavations. There are four foreign archaeological institutes, the French, German, American, and British. Street railroads have been made in the principal streets, and the city is connected by railway (6 miles) with its port, the Piræus. Pop. 85,000.

Athens, county seat of Clarke co., Ga., on the Oconee river, 73 m. n. e. of Atlanta; on the Georgia, the Central of Georgia and the Seaboard Air Line railroads. The city has an extensive cotton trade, and has cotton mills and other manufactures. It is the seat of the University of Georgia, the State College of Agriculture, a state normal and the Lucy Cobb Institute for Girls. The city was founded in 1800 as the seat of the state university. Since 1890, its growth has been steady. Pop. 1900, 10,245.

Athol, Worcester co., Mass., on Miller River; large manufactures of woolen and boots and shoes; 28 mi. from Worcester. Pop. 7,061.

Athletic Sports.—Although this term is undoubtedly derived from the ancients, the derivation does not exactly indicate its present meaning, inasmuch as our modern athletes are distinctly defined to be amateurs, in contradistinction to professionals. In fact the former pursue the agonistic art, and should be styled "agonistics," if we may be allowed to invent such a word, rather than athletes. How the pastime came to be thus named in Britain some thirty years ago, it is hard to say. Till about 1860, all exercises wherein the feet played the principal part were rightly styled "pedestrianism." Up to that period all prizes, whether contended for by amateurs or professionals, were invariably in money. As the practise of the pastime, however, rapidly spread among the former, it was naturally found they were loth to compete on the same terms with, and for similar trophies as, the latter. Hence arose the modern definition of an amateur athlete; viz., "any person who has never competed in an open competition, or for public money, or for admission money, or with professionals for a prize, public money, or admission money; nor has ever at any period of his life taught or assisted in the pursuit of athletic exercises, as a means of livelihood; nor is a mechanic, artisan, or laborer." The moment this definition was brought into force a wide barrier arose between the two classes, and amateurs ceased to compete for money prizes among themselves, or against professionals,

Atlantic City

on any terms, unless they were willing to forfeit their status.

Athor (Hathor or Het-her), an Egyptian goddess, identified with Aphrodītē (or Venus). Her symbol was the cow bearing on its head the solar disc and hawk-feather plumes. Her chief temple was at Denderah. From her the third month of the Egyptian year derived its name.

A'thos (now *Hagion Oros* or *Monte Santo*, that is, Holy Mountain), a mountain 6,700 ft. high in European Turkey, terminating the most eastern of the three peninsulas jutting into the Archipelago. The name, however, is frequently applied to the whole peninsula, which is about 30 mi. long by 5 broad. It is covered with forests, and plantations of olive, vine, and other fruit trees. The Persian fleet under Mardonius was wrecked here in 493 B. C., and to avoid a similar calamity Xerxes caused a canal, of which traces may yet be seen, to be cut through the isthmus that joins the peninsula to the mainland. On the peninsula there are situated about twenty monasteries and a multitude of hermitages, which contain from 6,000 to 8,000 monks and hermits of the order of St. Basil. The libraries of the monasteries are rich in literary treasures and manuscripts. Every nation belonging to the Greek Church has here one or more monasteries of its own, which are annually visited by pilgrims. The various religious communities form a species of republic, paying an annual tribute of nearly \$20,000 to the Turks, and governed by a synod of twenty monastic deputies and four presidents, meeting weekly. At the present day no Mohammedan, except the Aga Bostanji, who acts as an intermediary between the monks and the sultan, can settle on the peninsula. The revenue of the community is derived from pilgrims, and from a considerable trade in amulets, rosaries, crucifixes, images, and wooden furniture.

Atkinson, EDWARD, b. at Brookline, Mass., 1827. He has written extensively on economic subjects, and is considered a high authority on questions of this character. He has written several articles on the silver question and on imperialism.

Atlanta, capital of Georgia, county seat of Fulton co., 294 miles n. w. of Savannah, has magnificent railroad connections and an extensive export trade in cotton, corn, tobacco, horses and mules. Railroads: A. K. & N.; Central; A. & P.; Georgia; A. & B. Atlanta's chief manufactures are cotton and paper bags, cottonseed oil, proprietary medicines, furniture and machine shop products. Groceries and dry goods are the largest items in Atlanta's wholesale trade. The city has a fine public library, state capitol, customhouse, and a chamber of commerce. It is the seat of the Georgia School of Technology, Atlanta University, Clark University and Atlanta Baptist College. The city was almost destroyed during the war, but it was quickly rebuilt and has grown rapidly in resources. Pop. 1900, 89,872.

Atlantic City, Atlantic co., N. J., on Atlantic Ocean, 60 mi. s. e. of Philadelphia. Railroads: West Jersey; Camden & Atlantic; and

Atlantic Ocean

Atlantic City. Surrounding country agricultural. It is a winter and summer health and pleasure resort, and has an elevated board walk 40 ft. wide and 4 mi. long. Population 1900, 27,838.

Atlantic Ocean, the vast expanse of sea lying between the west coasts of Europe and Africa and the east coasts of North and South America, and extending from the Arctic to the Antarctic Ocean; greatest breadth, between the west coast of Northern Africa and the east coast of Florida, 4,150 mi.; least breadth, between Norway and Greenland, 930 mi.; superficial extent, 25,000,000 sq. mi. The principal inlets and bays are Baffin's and Hudson's Bays, the Gulf of Mexico, the Caribbean Sea, the North Sea (or German Ocean), the Bay of Biscay, and the Gulf of Guinea. The principal islands north of the equator are Iceland, the Faroe and British Islands, the Azores, Canaries, and Cape Verd Islands, Newfoundland, Cape Breton, and the West India Islands; and south of the equator, Ascension, St. Helena, and Tristan da Cunha.

The great currents of the Atlantic are the Equatorial Current (divisible into the Main, Northern, and Southern Equatorial Currents), the Gulf-stream, the North African and Guinea Current, the Southern Connecting Current, the Southern Atlantic Current, the Cape Horn Current, Rennel's Current, and the Arctic Current. The current system is primarily set in motion by the trade-winds which drive the water of the intertropical region from Africa toward the American coasts. The Main Equatorial Current, passing across the Atlantic, is turned by the S. American coast, along which it runs at a rate of 30 to 50 miles a day, till, having received part of the North Equatorial Current, it enters the Gulf of Mexico. Issuing thence between Florida and Cuba under the name of the Gulf-stream, it flows with a gradually expanding channel nearly parallel to the coast of the U. S. It then turns northeastward into the mid-Atlantic, the larger proportion of it passing southward to the east of the Azores to swell the North African and Guinea Current created by the northerly winds off the Portuguese coast. The Guinea Current, which takes a southerly course, is divided into two on arriving at the region of the northeast trades, part of it flowing east to the Bight of Biafra and joining the South African feeder of the Main Equatorial, but the larger portion being carried westward into the North Equatorial drift. Rennel's Current, which is possibly a continuation of the Gulf-stream, enters the Bay of Biscay from the west, curves round its coast, and then turns northwest toward Cape Clear. The Arctic Current runs along the east coast of Greenland (being here called the Greenland Current), doubles Cape Farewell, and flows up toward Davis's Strait; it then turns to the south along the coasts of Labrador and the U. S., from which it separates the Gulf-stream by a cold band of water. Immense masses of ice are borne south by this current from the Polar seas. In the interior of the North Atlantic there is a large area comparatively free

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from currents, called the Sargasso Sea, from the large quantity of sea-weed (of the genus *Sargassum*) which drifts into it. A similar area exists in the South Atlantic. In the South Atlantic, the portion of the Equatorial Current which strikes the American coast below Cape St. Roque flows southward at the rate of from 12 to 20 miles a day along the Brazil coast under the name of the Brazil Current. It then turns eastward and forms the South Connecting Current, which, on reaching the South African coast, turns northward into the Main and Southern Equatorial Currents. Besides the surface currents, an under current of cold water flows from the poles to the equator, and an upper current of warm water from the equator toward the poles.

The greatest depth yet discovered is north of Porto Rico, in the West Indies, namely 27,360 feet. Cross-sections of the North Atlantic between Europe and America show that its bed consists of two great valleys lying in a north and south direction, and separated by a ridge, on which there is an average depth of 1,600 or 1,700 fathoms, while the valleys on either side sink to the depth of 3,000 or 4,000 fathoms. A ridge, called the *Wyville-Thomson Ridge*, with a depth of little more than 200 fathoms above it, runs from near the Butt of Lewis to Iceland, cutting off the colder water of the Arctic Ocean from the warmer water of the Atlantic. The South Atlantic, of which the greatest depth yet found is over 3,000 fathoms, resembles the North Atlantic in having an elevated plateau or ridge in the centre with a deep trough on either side. The saltness and specific gravity of the Atlantic gradually diminish from the tropics to the poles, and also from within a short distance of the tropics to the equator. In the neighborhood of the British Isles the salt has been stated at one thirty-eighth of the weight of the water. The North Atlantic is the greatest highway of ocean traffic in the world. It is also a great area of submarine communication, by means of the telegraphic cables that are laid across its bed.

Atlantic Telegraph.—J. J. Craven's experiment in 1847 led to the laying of a gutta-percha cable between New York and Jersey City, 1848. In 1850 an experimental line was laid across the English Channel, followed (1851) by a permanent cable. The plan to connect a line of fast steamers with a cable carried across the Island of St. Johns was next attempted. The New York, Newfoundland, & London Telegraph Co. began operations to connect St. Johns, Newfoundland, with telegraphic lines in the U. S. and British America. The first attempt to lay a cable (1855) across the Gulf of St. Lawrence failed. Another attempt (1856) succeeded. The idea of carrying the cable across the ocean originated with Mr. Cyrus W. Field of New York (1854). Mr. Field went to London (1856) and in face of many difficulties, organized the first Atlantic Telegraph Co., himself subscribing more than one fourth the capital, \$1,750,000. To this company were given all the privileges con-

ferred on the old company. The governments of Great Britain and the U. S. gave substantial aid, and furnished ships for laying the cable. The *Niagara* and *Agamemnon* sailed west from Valentia, Ireland, Aug. 7, 1857, each bearing 1,250 mi. of the cable. The *Niagara* paid her portion out as she went. On August 11, 280 mi. out, the cable snapped, the end sinking in 2,000 fathoms of water, and the ships returned to Portsmouth. The same ships left Valentia again, June 10, 1858, for a second trial, submersion to begin in mid-ocean, one ship going east, the other west. On the 29th a double break occurred, 144 mi. of cable being lost. Even directors now lost faith. Still they prosecuted the work. July 29 the cable was again lowered in mid-ocean, this time with success. The *Agamemnon* arrived at Valentia, Ireland, August 6, and the *Niagara* at Trinity Bay, N. F. about the same time, both having successfully lowered their portion of the cable. August 17 the following message was flashed through the ocean: "Europe and America are united by telegraph. Glory be to God in the highest; on earth peace and good-will toward men." The Newfoundland station was connected with the general telegraph system of America, and the station at Valentia with the general system of Europe. This cable continued in good working order until Sept. 1, 1858.

From 1858-1864 Mr. Field was busy raising new capital. The Telegraph Construction and Maintenance Co. was formed. This company constructed cable much thicker and more costly than the other. The *Great Eastern* was enlisted in the laying, and steamed away from Valentia, July 23, 1865. The cable snapped, August 2, and the end sunk in 2,000 fathoms of water 1,064 mi. from land. Dredging to bring up the end proved unavailing and the *Great Eastern* returned. A new capital was raised and a new cable weighing 500 pounds per mi. less was made. July 13, 1866, the *Great Eastern* again left Valentia accompanied by the steamers *Terrible*, *Midway*, and *Albany*. The route chosen was midway between the cables of 1858 and 1865. Success attended this attempt and the *Great Eastern* reached Heart's Content, N. F., July 27. The end of the 1865 cable was raised September 1, spliced with additional lengths, and laid to Heart's Content. Thus a second line of communication was established between America and Ireland. These two cables have been kept in good working order, and the heavy expenditures have yielded good dividends.

Atlan'tis, an island which, according to Plato, existed in the Atlantic over against the Pillars of Hercules (Straits of Gibraltar), was the home of a great nation, and was finally swallowed up by the sea. The legend has been accepted by some as fundamentally true; but others have regarded it as the outgrowth of some early discovery of the New World.

At'las, an extensive mountain system in North Africa, starting near Cape Nun on the Atlantic Ocean, traversing Morocco, Algiers, and Tunis, and terminating on the coast of

the Mediterranean; divided generally into two parallel ranges, running w. to e., the Greater Atlas lying toward the Sahara and the Lesser Atlas toward the Mediterranean. The principal chain is about 1,500 mi. long, and the principal peaks rise above or approach the line of perpetual congelation; Miltsin in Morocco being 11,500 feet high, and another peak in Morocco 11,500 feet high. The highest elevations are perhaps over 13,000 feet. Silver, antimony, lead, copper, iron, etc., are among the minerals. The vegetation is chiefly European in character, except on the low grounds and next the desert.

Atlas, in Greek mythology, the name of a Titan whom Zeus condemned to bear the vault of heaven. The same name is given to a collection of maps and charts, and was first used by Gerard Mercator in the sixteenth century, the figure of Atlas bearing the globe being given on the title-pages of such works.

At'mosphere, primarily the gaseous envelope which surrounds the earth; but the term is applied to that of any orb. The atmosphere of the earth consists of a mass of gas extending to a height variously estimated at from 45 to 212 mi., and pressing on every part of the earth's surface with a pressure of about 15 (14.73) lbs. per sq. in. The existence of this atmospheric pressure was first proved by Torricelli, who thus accounted for the rush of a liquid to fill a vacuum, and who, working out the idea, produced the first barometer. The average height of the mercurial column, counterbalancing the atmospheric weight at the sea-level, is a little less than 30 in.; but the pressure varies from hour to hour, and roughly speaking, diminishes geometrically with the arithmetical increase in altitude. Of periodic variations there are two maxima of daily pressure occurring, when the temperature is about the mean of the day, and two minima, when it is at its highest and lowest respectively; but the problems of diurnal and seasonal oscillations have yet to be fully solved. The pressure upon the human body of average size is no less than 14 tons, but as it is exerted equally in all directions no inconvenience is caused by it. It is customary to take the atmospheric pressure as the standard for measuring other fluid pressures; thus the steam pressure of 30 lbs. per sq. in. on a boiler is spoken of as a pressure of two atmospheres.

The atmosphere, first subjected to analysis by Priestley and Scheele in the latter part of the eighteenth century, consists of a mixture of oxygen and nitrogen in the almost constant proportion of 20.81 volumes of oxygen to 79.19 volumes of nitrogen, or, by weight, 23.01 parts of oxygen to 76.99 of nitrogen. The gases are associated together, not as a chemical compound, but as a mechanical mixture. Upon the oxygen present depends the power of the atmosphere to support combustion and respiration, the nitrogen acting as a diluent to prevent its too energetic action. Besides these gases, the air contains aqueous vapor in variable quantity, ozone, carbonic acid gas, traces of ammonia, and, in towns, sulphuretted hydro-

gen and sulphurous acid gas. After thunderstorms, nitric acid is also observable. In addition to its gaseous constituents the atmosphere is charged with minute particles of organic and inorganic matter.

Atmospheric Electricity, the electricity manifested by the atmosphere, and made sensibly observable in the lightning flash.

Atmospheric Railway. See *Pneumatic Dispatch*.

Atomic Theory, a theory as to the existence and properties of atoms; especially, in chemistry, the theory accounting for the fact that in compound bodies the elements combine in certain constant proportions, by assuming that all bodies are composed of ultimate atoms, the weight of which is different in different kinds of matter. It is associated with the name of Dalton, who systematized and extended the imperfect results of his predecessors. On its practical side the atomic theory asserts three *Laws of Combining Proportions*: 1, the Law of Constant or Definite Proportions, teaching that in every chemical compound the nature and proportion of the constituent elements are definite and invariable; thus, water invariably consists of 8 parts by weight of oxygen to 1 part by weight of hydrogen; 2, the Law of Combination in Multiple Proportions, according to which the several proportions in which one element unites with another invariably bear toward each other a simple relation; thus, 1 part by weight of hydrogen unites with 8 parts by weight of oxygen to form water, and with 16 parts (i. e., 8×2) of oxygen to form peroxide of hydrogen; 3, the Law of Combination in Reciprocal Proportions, that the proportions in which two elements combine with a third also represent the proportions in which, or in some simple multiple of which, they will themselves combine; thus, in olefiant gas, hydrogen is present with carbon in the proportion of 1 to 6; and in carbonic oxide, oxygen is present with carbon in the proportion of 8 to 6, 1 to 8 being also the proportions in which hydrogen and oxygen combine with each other. The theory that these *proportional numbers* are, in fact, nothing else but the relative weights of atoms so far accounts for the phenomena that the existence of these laws might have been predicted by the aid of the atomic hypothesis long before they were actually discovered by analysis. In themselves, however, the laws do not prove the theory of the existence of ultimate particles of matter of a certain relative weight; and although many chemists, even without expressly adopting the atomic theory itself, have followed Dalton in the use of the terms *atom* and *atomic weight*, in preference to *proportion*, *combining proportion*, *equivalent*, and the like, yet in using the word *atom* it should be held in mind that it merely denotes the proportions in which elements unite. These will remain the same whether the atomic hypothesis which suggested the employment of the term be true or false. Dalton supposed that the atoms of bodies are spherical, and invented certain symbols to rep-

resent the mode in which he conceived they might combine.

Atoms, according to the hypothesis of some philosophers, the primary parts of elementary matter not further divisible. The principal theorists of antiquity upon the nature of atoms were Moschus of Sidon, Leucippus (510 B. C.), Democritus, Epicurus, and Lucretius. These philosophers explained all phenomena on the theory of the existence of atoms possessing various properties and motions, and are hence sometimes called *Atomists*. Among the moderns, Gassendi illustrated the doctrine of Epicurus. Descartes formed from this his system of the vortices. Newton and Boerhaave supposed that the original matter consists of hard, ponderable, impenetrable, inactive, and immutable particles, from the variety in the composition of which the variety of bodies originates. According to Boscovich every atom is an indivisible point possessing position, mass, and potential force or capacity for attraction and repulsion. Upon the discovery of Helmholtz that a vortex in a perfect liquid possesses certain permanent characteristics, Sir W. Thomson has based a theory that atoms are vortices in a homogeneous, incompressible, and frictionless fluid. As to chemical atoms, see *Atomic Theory*.

Atreus (at' rūs), in Greek mythology, a son of Pelops and Hippodamia, grandson of Tantalus and progenitor of Agamemnon. He succeeded Eurystheus, his father-in-law, as king of Mycenæ, and in revenge for the seduction of his wife by his brother Thyestes gave a banquet at which the latter partook of the flesh of his own sons. Atreus was killed by Ægisthus, a son of Thyestes. The tragic events connected with this family furnished materials to some of the great Greek dramatists.

At'rophy, a wasting of the flesh due to some interference with the nutritive processes. It may arise from a variety of causes, such as permanent, oppressive, and exhausting passions, organic disease, a want of proper food or of pure air, suppurations in important organs, copious evacuations of blood, saliva, semen, etc., and it is also sometimes produced by poisons; for example, arsenic, mercury, lead, in miners, painters, gilders, etc. In old age the whole frame except the heart undergoes atrophic change, and it is of frequent occurrence in infancy as a consequence of improper, unwholesome food, exposure to cold, damp, or impure air, etc. Single organs or parts of the body may be affected irrespective of the general state of nutrition; thus local atrophy may be superinduced by palsies, the pressure of tumors upon the nerves of the limbs, or by artificial pressure, as in the feet of Chinese ladies.

At'ropos, the eldest of the Fates, who cuts the thread of life with her shears.

Att'alus, the names of three kings of ancient Pergamus, 241-133 B. C., the last of whom bequeathed his kingdom to the Romans. They were all patrons of art and literature.

At'tar, in the East Indies, a general term for a perfume from flowers; in Europe, gener-

Attenuation

ally used only of the *attar* or *otto of roses*, an essential oil made from the hundred-leaved or cabbage rose, damask rose, or musk rose, etc., 100,000 roses yielding only 180 grains of attar. Cashmere, Shiraz, and Damascus are celebrated for its manufacture, and there are extensive rose farms in the valley of Kezanlik in Roumelia and at Ghazipur in Benares. The oil is at first greenish, but afterward it presents various tints of green, yellow, and red. It is concrete at all ordinary temperatures, but becomes liquid about 84° F. It is frequently adulterated with the oils of rhodium, sandalwood, and geranium, with the addition of camphor or spermaceti.

Atten'uation, in brewing, the change which takes place in the saccharine wort during fermentation by the conversion of sugar into alcohol and carbonic acid, with diminution of specific gravity.

Attic, an architectural term variously used. An *Attic base* is a peculiar kind of base, used by the ancient architects in the Ionic order, and by Palladio and some others in the Doric. An *Attic story* is a low story in the upper part of a house rising above the main portion of the building. In ordinary language an attic is an apartment lighted by a window in the roof.

At'tica, a state of ancient Greece, the capital of which, Athens, was once the first city in the world. Now a province of Greece. Pop. 185,364.

At'ticus, TITUS POMPONIUS (109-32 B. C.), a Roman of great wealth and culture. He so identified himself with Greek life and literature as to receive the surname Atticus. Sulla and the Marian party, Cæsar and Pompey, Brutus and Antony, were alike friendly to him, and he was in favor with Augustus. Of his close friendship with Cicero proof is given in the series of letters addressed to him by Cicero.

At'tila, the famous leader of the Huns, was the son of Mundzuk, and the successor, in conjunction with his brother Bleda, of his uncle Rhuas. The rule of the two leaders extended over a great part of Northern Asia and Europe, and they threatened the Eastern Empire, and twice compelled the weak Theodosius II to purchase an inglorious peace. Attila caused his brother Bleda to be murdered, 444, and in a short time extended his domination over all the peoples of Germany. Attila died on the night of his marriage with Hilda (or Ildico), 453, either from the bursting of a blood-vessel or by her hand. The description that Jornandes has left us of him is in keeping with his Kalmuck-Tartar origin. He had a large head, a flat nose, broad shoulders, and a short and ill-formed body; but his eyes were brilliant, his walk stately, and his voice strong and well-toned.

Attleborough, Bristol co., Mass. Pop. 11,335

Attrac'tion, the tendency of all material bodies, whether masses or particles, to approach each other, to unite, and to remain united. It was Newton that first adopted the theory of a universal attractive force, and de-

Auburn

termined its laws. When bodies tend to come together from sensible distances the tendency is termed either the attraction of *gravitation*, *magnetism*, or *electricity*, according to circumstances; when the attraction operates at insensible distances it is known as *adhesion* with respect to surfaces; as *cohesion* with respect to the particles of a body; and as *affinity* when the particles of different bodies tend together. It is by the attraction of gravitation that all bodies fall to the earth when unsupported.

At'tribute in philosophy, a quality or property of a substance, as whiteness or hardness. A substance is known to us only as a congeries of attributes. In the fine arts an attribute is a symbol regularly accompanying and marking out some personage. Thus the caduceus, purse, winged hat, and sandals are attributes of Mercury, the trampled dragon of St. George.

Attwood, GEORGE (1745-1807), an English mathematician, best known by his invention, called after him *Attwood's Machine*, for verifying the laws of falling bodies. It consists essentially of a freely moving pulley over which runs a fine cord with two equal weights suspended from the ends. A small, additional weight is laid upon one of them, causing it to descend with uniform acceleration. Means are provided by which the added weight can be removed at any point of the descent, thus allowing the motion to continue from this point onward with uniform velocity.

Aube (6b), a northeastern French department. Area 2,351 sq. mi.; pop. 257,374. The surface is undulating and watered by the Aube, etc. The n. and n.w. districts are bleak and infertile, the southern districts remarkably fertile. A large extent of ground is under forests and vineyards, and the soil is admirable for grain, pulse, and hemp. The chief manufactures are worsted and hosiery. Troyes is the capital. The river Aube, which gives name to the department, rises in Haute-Marne, flows n.w., and after a course of 113 mi. joins the Seine.

Auber (5-bâr), DANIEL FRANÇOIS ESPRIT (1782-1871), a French operatic composer. He was originally intended for a mercantile career, but devoted himself to music, studying under Cherubini. His first great success was his opera *La Bergère Châtelaine*, produced in 1820. In 1822 he had associated himself with Scribe as librettist, and other operas now followed in quick succession. Chief among them were *Masaniello* or *La Muette de Portici* (1828), *Fra Diavolo* (1830), *Lestocq* (1834), *L'Ambassadrice* (1836), *Le Domino Noir* (1837), *Les Diamants de la Couronne* (1841), *Marco Spada* (1853), *La Fiancée du Roi de Garbe* (1864). Despite his success in *Masaniello*, his peculiar field was comic opera, which, bearing strongly the stamp of French national character, won him a high place.

Auburn, Cayuga co., N. Y., on Owasco outlet, 2 mi. n. of Owasco Lake. Railroads: N. Y. C., & H. R. Ry.; Lehigh Valley (Auburn division). Industries: agricultural machinery and implements, three flouring mills,

Auburn

two iron foundries, two woolen mills, three shoe factories, carpet and bicycle factories, and a number of others. Located at Auburn is one of the three state prisons, which was built in 1817, and the Auburn Theological Seminary. The town was first settled in 1792 and became a city in 1848. Population 1900, 30,345.

Auburn, Androscoggin co., Me., a commercial center on Androscoggin river. Pop. 1900, 12,951.

Aubusson (ô-bû-sûn), a town of the interior of France, dep. Creuse, celebrated for its carpets. Pop. 6,723.

Auch (ôsh), a town of s. w. France, capital of dep. Gers; the seat of an archbishop, with one of the finest Gothic cathedrals in France; manufactures linens, leather, etc. Pop. 9,670.

Auck'land, a town of New Zealand, situated on Waitemata Harbor, one of the finest harbors of New Zealand. It has a large trade, there being connection with the chief places on the island by rail, and regular communication with the other ports of the colony, Australia, and Fiji by steam. It was formerly the capital of the colony. Pop., including suburbs, 57,048. The provincial district of Auckland forms the northern part of North Island, with an area of 36,000 sq. mi.; pop. 112,000. The surface is very diversified; volcanic phenomena are common, including geysers, hot lakes, etc.; rivers are numerous; wool, timber, kauri-gum, etc., are exported. Much gold has been obtained in the Thames Valley and elsewhere.

Auction is a public sale to the party offering the highest price where the buyers bid upon each other, or to the bidder who first accepts the terms offered by the vendor where he sells by reducing his terms until some one accepts them. The latter form is known as a *Dutch Auction*. A sale by auction must be conducted in the most open and public manner possible; and there must be no collusion on the part of the buyers. Puffing or mock bidding to raise the value by apparent competition is illegal.

Aude (ôd), a maritime department in the s. of France. Area 2,437 sq. mi. The wines, especially white, bear a good name; olives and other fruits are also cultivated. The manufactures are varied; the trade is facilitated by the Canal du Midi. Carcassonne is the capital; other towns are Narbonne and Castelnaudary. Pop. 332,080. The river Aude rises in the eastern Pyrenees, and flowing nearly parallel to the Canal du Midi falls into the Mediterranean, after a course of 130 mi.

Au'diphone, an acoustic instrument by means of which deaf persons are enabled to hear. It consists essentially of a fan-shaped plate of hardened caoutchouc, which is bent to a greater or less degree by strings, and is very sensitive to sound-waves. When used the up edge is pressed against the upper front teeth, with the convexity outward, and the sounds being collected are conveyed from the teeth to the auditory nerve without passing through the external ear.

Augeas

Auditorium Building, Chicago. This building includes the Auditorium which has a permanent seating capacity of over 4,000, which can be increased for conventions, etc., to about 8,000. It has the most costly stage and organ in the world, recital hall with a seating capacity of over 500; the business portion with stores and 136 offices; tower observatory to which the public are admitted; the U. S. signal service occupies the 17th, 18th, and 19th floors of the tower; the hotel has 400 guest rooms and a dining room 175 ft. long, a banquet hall, on which \$30,000 was expended for decorating, built of steel trusses, spanning 120 ft. over the Auditorium. This building was started in January, 1887, and finished in October, 1889. It covers about one and a half acres, and has a street frontage of 710 ft. The height of the main building is 145 ft., total height of tower 270 ft. The entire weight of the building is 110,000 tons. There are 25 mi. of gas and water pipe, 230 mi. of electric wire and cable, 11 mi. of steel cable for moving scenes on the stage, electric dynamos and hydraulic motors, and 26 hydraulic lifts for moving stage platforms.

Audran (1842-1901), a French composer well known by his operas, *The Mascot* and *The Grand Mogul* and the operetta, *Miss Helyet*. Of these *The Mascot* is best known in the United States. He died Aug. 18, 1901.

Au'dubon, JOHN JAMES (1780-1851), an American naturalist of French extraction. He was educated in France, and studied painting under David. In 1798 he settled in Pennsylvania, but having a great love for ornithology, he set out, in 1810, with his wife and child, descended the Ohio, and for many years roamed the forests in every direction drawing the birds which he shot. In 1826 he went to England, exhibited his drawings in Liverpool, Manchester, and Edinburgh, and finally published them in an unrivaled work of double-folio size, with 435 colored plates of birds the size of life (*The Birds of America*, 4 vols., 1827-39), with an accompanying text (*Ornithological Biography*, 5 vols., 8 vo., partly written by Prof. Macgillivray). On his final return to America he labored with Dr. Bachman on a finely illustrated work entitled *The Quadrupeds of America* (1843-50, 3 vols.). He d. at New York.

Auerbach (ou'ér-bäk), BERTHOLD (1812-1882), a distinguished German author of Jewish extraction. He abandoned the study of Jewish theology in favor of philosophy, publishing in 1836 his *Judaism and Modern Literature* and a translation of the works of *Spinoza* with critical biography. His later works were tales or novels and his *Village Tales of the Black Forest*, as well as others of his writings, have been translated into several languages. Other works: *Barfüssell*; *Joseph im Senee*; *Edelweiss*; *Auf der Höhe*; *Das Landhaus am Rhein*; *Waldfried*; *Brigitta*.

Augeas (â-je'as), a fabulous king of Elis, in Greece, whose stable contained 3,000 oxen, and had not been cleaned for thirty years. Hercules undertook to clear away the filth in one day in return for a tenth part of the cattle, and executed the task by turning the river

Augite

Alpaëus through it. Augeas, having broken the bargain, was deposed and slain by Hercules.

Augite (g'jīt) (or Pyroxene), a mineral of the hornblende family, an essential component of many igneous rocks, such as basalt, greenstone, and porphyry. A transparent green variety found at Zillerthal, in the Tyrol, is used in jewelry.

Augsburg (ougz'burh), a city of Bavaria, renowned commercial center in the Middle Ages, and is still an important emporium of south German and Italian trade. Industries: cotton spinning and weaving, dyeing, woolen manufacture, machinery and metal goods, books and printing, chemicals, etc. The Emperor Augustus established a colony here about 12 B. C. In 1276 it became a free city, and besides being a great mart for the commerce between the north and south of Europe it was a great center of German art in the Middle Ages. It early took a conspicuous part in the Reformation. In 1806 it was incorporated in Bavaria. Pop. 65,476.

Augur, CHRISTOPHER COLON, b. 1821, in New York, graduated at West Point in 1843, served in the Mexican War and on the frontier, and was made a brigadier-general of volunteers in November, 1861. He fought at Cedar Mountain and at the siege of Port Hudson, and received the brevet of major-general for distinguished services in the field in 1865. In 1885 he was retired under the rule.

Au'gurs, a board or college of diviners who, among the Romans, predicted future events and announced the will of the gods from the occurrence of certain signs. These consisted of signs in the sky, especially thunder and lightning; signs from the flight and cries of birds; from the feeding of the sacred chickens; from the course taken or sounds uttered by various quadrupeds or by serpents; from accidents or occurrences, such as spilling the salt, sneezing, etc. The answers of the augurs, as well as the signs by which they were governed, were called *auguries*, but bird-predictions were properly termed *auspices*. Nothing of consequence could be undertaken without consulting the augurs, and by the mere utterance of the words *alio die* ("meet on another day") they could dissolve the assembly of the people and annul all decrees passed at the meeting.

Au'gust, the eighth month from January. It was the sixth of the Roman year, and hence was called *Sextilis* till the Emperor Augustus affixed to it his own name.

Augusta (ou-gus'tā) (or Agos'ta), a seaport in the s.e. of Sicily, 12 mi. n. of Syracuse. It exports salt, oil, honey, etc. Pop. 13,286.

Augusta, Kennebec co., Me., on Kennebec river, 6 mi. n. of Gardiner. Railroads: Maine Central & Augusta, Hallowell & Gardiner Electric road. Industries: large cotton mills, sash and door factories, lumber, and fiber. Surrounding country agricultural. The town was first settled in 1754. It was an Indian trading post in 1628, known as Cushnoe, and in 1754 it became an outport of the Plymouth Company, known as Fort Western. The town

Augustus

was incorporated as Hallowell in 1771, and the name changed to Harrington in 1797, and the same year the name was changed to Augusta. Augusta was made the capital of Maine in 1827 and became a city in 1849. Population 1900, 11,683.

Augusta, county seat of Richmond co., Ga., on the Savannah river, 231 m. from its mouth, at the head of navigation. The city is one of the largest cotton markets of the South, has an extensive lumber trade, ships great quantities of fruits and vegetables and has important manufactures of cotton goods, fertilizers, ice, iron and lumber products, cottonseed oil and tobacco. The Augusta Canal furnishes the water power for manufactures. Augusta was in the early days a very important military post. It is a popular health resort, and the seat of the Georgia Medical College, Richmond Academy, St. Mary's and Sacred Heart Academies and Paine's Institute for Colored Students. Pop. 1900, 39,441.

Au'gustine, AURELIUS AUGUSTINUS, St. (354-430), a renowned father of the Christian Church. He was a man of great enthusiasm, powerful intellect and strong influence.

Au'gustine (or AUSTIN, St.), the *Apostle of the English*, flourished at the close of the sixth century, was sent with forty monks by Pope Gregory I to introduce Christianity into Saxon England, and was kindly received by Ethelbert, king of Kent, whom he converted, baptizing 10,000 of his subjects in one day.

Augus'tulus, ROMULUS, the last of the Western Roman emperors (475-76.)

Augus'tus, CAIUS JULIUS CÆSAR OCTAVIANUS, originally called Caius Octavius, Roman emperor, was the son of Caius Octavius and Atia, a daughter of Julia, the sister of Julius Cæsar. He was b. 63 B. C., and d. A. D. 14. He returned to Rome to claim Cæsar's property and avenge his death, and now took, according to usage, his uncle's name with the surname Octavianus. He got himself chosen consul in 43. Soon after the first triumvirate was formed between him and Antony and Lepidus, and this was followed by the conscription and assassination of 300 senators and 2,000 knights of the party opposed to the triumvirate. Next year Octavianus and Antony defeated the republican army under Brutus and Cassius at Philippi. The victors now divided the Roman world between them, Octavianus getting the West, Antony the East, and Lepidus Africa. Sextus Pompeius, who had made himself formidable at sea, had now to be put down; and Lepidus, who had hitherto retained an appearance of power, was deprived of all authority (B. C. 36) and retired into private life. Antony and Octavianus now shared the empire between them; but while the former, in the East, gave himself up to a life of luxury, and alienated the Romans by his alliance with Cleopatra and his adoption of Oriental manners, Octavianus skillfully cultivated popularity, and soon declared war ostensibly against the queen of Egypt. The naval victory of Actium, in which the fleet of Antony and Cleopatra was defeated,

Augustus II

made Octavianus master of the world, B. C. 31. He returned to Rome B. C. 29, celebrated a splendid triumph, and caused the Temple of Janus to be closed in token of peace being restored. Gradually all the highest offices of state, civil and religious, were united in his hands, and the new title of Augustus was also assumed by him, being formally conferred by the senate in B. C. 27. Under him successful wars were carried on in Africa and Asia (against the Parthians), in Gaul and Spain, in Pannonia, Dalmatia, etc.; but the defeat of Varus by the Germans under Arminius with the loss of 3 legions, A. D. 9, was a great blow to him in his old age. He adorned Rome in such a manner that it was said, "He found it of brick, and left it of marble." The people erected altars to him, and, by a decree of the senate, the month Sextilis was called *Augustus* (our August). Vergil and Horace were befriended by him, and their works and those of their contemporaries are the glory of the *Augustan Age*. His death, which took place at Nola, plunged the empire into the greatest grief. He was thrice married, but had no son, and was succeeded by his stepson Tiberius, whose mother, Livia, he had married after prevailing on her husband to divorce her.

Augustus II (1670-1733) (or **FREDERICK-AUGUSTUS I**), elector of Saxony and king of Poland, second son of John George III, elector of Saxony, b. at Dresden, d. at Warsaw, Poland. He succeeded his brother in the electorate in 1694, and the Polish throne having become vacant, in 1696, by the death of John Sobieski, Augustus presented himself as a candidate for it and was successful. He joined with Peter the Great in the war against Charles XII of Sweden. In 1704 he was deposed, and two years later formally resigned the crown to Stanislaus I. In 1709, after the defeat of Charles at Pultowa, the Poles recalled Augustus, who united himself anew with Peter. The death of Charles XII put an end to the war, and Augustus concluded a peace with Sweden. Augustus now gave himself wholly up to voluptuousness and a life of pleasure. The Poles yielded but too readily to the example of their king, and the last years of his reign were characterized by boundless luxury and corruption of manners. The Countess of Königsmark bore him the celebrated commander Marshal Saxe (Maurice of Saxony).

Augustus III (1696-1763) (or **FREDERICK-AUGUSTUS II**), elector of Saxony and king of Poland, son of Augustus II, b. at Dresden, succeeded his father as elector in 1733, and was chosen king of Poland through the influence of Austria and Russia. He distinguished himself by the splendor of his feasts and the extravagance of his court. During the first Silesian war he formed a secret alliance with Austria. The consequence was that during the second Silesian war Frederick the Great of Prussia pushed on into Saxony, and occupied the capital, from which Augustus fled. By the peace of Dresden, 1745, he was reinstated in the possession of Saxony. In 1756 he was involved anew in a war against

Aumale

Prussia. When Frederick declined his proposal of neutrality he left Dresden, and entered the camp at Pirna, where 17,000 Saxon troops were assembled. Frederick surrounded the Saxons, who were obliged to surrender, and Augustus fled to Poland. On the threat of invasion by Russia he returned to Dresden, where he died. His son, Frederick Christian, succeeded him as elector of Saxony, and Stanislaus Poniatowski as king of Poland.

Auk, a name of certain swimming birds, including the great auk, the little auk, the puffin, etc. The genus *auks* proper, contains only two species, the great auk and the razor-bill. The great auk or gair-fowl, a bird about 3 feet in length, used to be plentiful in northern regions, and also visited the British shores, but has become extinct. Some seventy skins, about as many eggs, with bones representing perhaps a hundred individuals, are preserved in various museums. Though the largest species of the family, the wings were only 6 inches from the carpal joint to the tip, totally useless for flight, but employed as fins in swimming, especially under water. The tail was about 3 inches long; the beak was high, short, and compressed; the head, neck and upper parts were blackish; a large spot under each eye, and most of the under parts white. Its legs were placed so far back as to cause it to sit nearly upright. The razor-bill is about 15 inches in length, and its wings are sufficiently developed to be used for flight. Thousands of these birds are killed on the coast of Labrador for their breast feathers which are warm and elastic.

Aulic, in the old German Empire, one of the two supreme courts of the German Empire, the other being the court of the imperial chamber. It had not only concurrent jurisdiction with the latter court, but in many cases exclusive jurisdiction, in all feudal processes and in criminal affairs, over the immediate feudatories of the emperor and in affairs which concerned the imperial government. The title is now applied in Germany in a general sense to the chief council of any department,—political, administrative, judicial, or military.

Aulis, in ancient Greece, a seaport in Bœotia, on the strait called Euripus, between Bœotia and Eubœa. See *Iphigenia*.

Aumale (ô-mäl), a small French town, department of Seine Inférieure, 35 mi. n.e. of Rouen, which has given titles to several notables in French history. **JEAN D'ARCOUR**, eighth **COUNT D'AUMALE**, fought at Agincourt, and defeated the English at Gravelle (1423). **CLAUDE II**, **DUC D'AUMALE**, one of the chief instigators of the Massacre of St. Bartholomew, was killed 1573. **CHARLES DE LORRAINE**, **DUC D'AUMALE**, was an ardent partizan of the League in the politico-religious French wars of the sixteenth century. **HENRI-EUGENE-PHILIPPE LOUIS D'ORLEANS**, **DUC D'AUMALE**, son of Louis Philippe, king of the French, b. in 1822. In 1847 he succeeded Marshal Bugeaud as governor general of Algeria, where he had distinguished himself in the war

Aurangabad

against Abd-el-Kader. After the revolution of 1848 he retired to England; but he returned to France in 1871, and was elected a member of the assembly; became inspector-general of the army in 1879, and was expelled along with the other royal princes in 1886. He is author of a *History of the House of Condé*, several pamphlets, etc.

Aurangabad', a town of India, in the territory of the Nizam of Haidarabad, 175 mi. from Bombay. It contains a ruined palace of Aurengzebe and a mausoleum erected to the memory of his favorite wife. It was formerly a considerable trading center, but its commercial importance decreased when Haidarabad became the capital of the Nizam. Pop. 20,500.

Aure'lian, LUCIUS DOMITIUS AURELIANUS (212-275), emperor of Rome, of humble origin, rose to the highest rank in the army, and on the death of Claudius II (270) was chosen emperor. He delivered Italy from the barbarians, and conquered the famous Zenobia, queen of Palmyra. He followed up his victories by the reformation of abuses, and the restoration throughout the empire of order and regularity. He lost his life by assassination, when heading an expedition against the Persians.

Aure'lius Antoni' nus, MARCUS (121-180 A.D.), often called simply Marcus Aurelius, Roman emperor and philosopher, son-in-law, adopted son, and successor of Antoninus Pius, succeeded to the throne 161. Brought up and instructed by Plutarch's nephew, Sextus, the orator Herodes Atticus, and L. Volusius Mecianus, the jurist, he had become acquainted with learned men, and formed a particular love for the Stoic philosophy. A war with Parthia broke out in the year of his accession, and did not terminate till 166. In 169 Verus died, and the sole command of the war devolved on Marcus Aurelius, who prosecuted it with the utmost rigor, and nearly exterminated the Marcomanni. After this victory the Marcomanni, the Quadi, as well as the rest of the barbarians, sued for peace. The sedition of the Syrian governor Avidius Cassius, with whom Faustina, the empress, was in treasonable communication, called off the emperor from his conquests, but before he reached Asia the rebel was assassinated. Aurelius returned to Rome, after visiting Egypt and Greece, but soon new incursions of the Marcomanni compelled him once more to take the field. He defeated the enemy several times, but was taken sick at Sirmium, and d. at Vindobona (Vienna). His only extant work is the *Meditations*, written in Greek, and which has been translated into most modern languages. Aurelius was one of the best emperors ever Rome saw, although his philosophy and the magnanimity of his character did not restrain him from the persecution of the Christians, whose religious doctrines he was led to believe were subversive of good government.

Au'rengzebe (-zëb) ("ornament of the

Aurora Borealis

throne"), one of the greatest of the Mogul emperors of Hindustan, b. in October, 1618 or 1619. In his twentieth year he raised a body of troops by his address and good fortune, and obtained the government of the Deccan. He murdered his relatives one after the other, and in 1659 ascended the throne. Two of his sons, who endeavored to form a party in their own favor, he caused to be arrested and put to death by slow poison. He conquered Golconda and Bijapur, and drove out, by degrees, the Mahrattas from their country. After his death the Mogul Empire declined.

Aurillac (ô-rê-yâk), a town of France, capital of the dep. Cantal, in a valley watered by the Jordanne, about 270 mi. s. of Paris, well built, with wide streets; copper works, paper works, manufactures of lace, tapestry, leather, etc. Pop. 13,727.

Aurochs (â-roks), a species of wild bull or buffalo, the *urus* of Cæsar, *bison* of Pliny, the European bison, *Bos* or *Bonassus Bison* of modern naturalists. This animal was once abundant in Europe, but were it not for the protection afforded by the emperor of Russia to a few herds which inhabit the forests of Lithuania it would soon be extinct.

Auro'ra, in classical mythology, the goddess of the dawn, daughter of Hyperion and Theia, and sister of Helios and Selēnē (Sun and Moon). She was represented as a charming figure, "rosy-fingered," clad in a yellow robe, rising at dawn from the ocean and driving her chariot through the heavens. Among the mortals whose beauty captivated the goddess, poets mention Orion, Tithōnus, and Cephālus.

Aurora, Kane co., Ill., on Fox River, 38 mi. w. of Chicago. Railroads: C. & B. & Q.; C. & N. W.; and E. J. & E. R. R. Industries: railroad shops, one flouring mill, five iron foundries, one cotton mill, stove works, two corset factories, and one carriage factory. Surrounding country agricultural. The settlement was first known as McCarty's Mills, the name "Aurora" being adopted late in 1837. A post-office was first established in 1837, with Burr Winton as postmaster. The first church organization was the M. E. in 1837. First school taught in spring of 1836, and first bridge built the same year. *Aurora Beacon*, established in 1846, and still flourishing, oldest paper in this section. The site of Aurora was once included in an Indian reservation. When Joseph McCarty arrived in April, 1834, he found a large Pottawatomie village on the west bank of the river, the head of the tribe being the noted chief Waubonsie. The first physician, Dr. Daniel Eastman, came in 1835. Joseph G. Stolp, still a resident, settled in 1837, and that fall built a wool-carding shop. He became a heavy manufacturer of woolen goods, continuing until 1886. Aurora became a city in 1857. Population 1900, 24,147.

Auro'ra Borea'lis, a luminous meteoric phenomenon appearing in the north, most frequently in high latitudes, the corresponding phenomenon in the southern hemisphere being

Auscultation

called *Aurora Australis*, and both being also called *Polar Light*, *Streamers*, etc. The northern aurora has been far the most observed and studied. It usually manifests itself by streams of light ascending toward the zenith from a dusky line of cloud or haze a few degrees above the horizon, and stretching from the north toward the west and east, so as to form an arc with its ends on the horizon, and its different parts and rays are constantly in motion. Sometimes it appears in detached places; at other times it almost covers the whole sky. It assumes many shapes and a variety of colors, from a pale red or yellow to a deep red or blood color; and in the northern latitudes serves to illuminate the earth and cheer the gloom of the long winter nights. The appearance of the aurora borealis so exactly resembles the effects of artificial electricity that there is every reason to believe that their causes are identical. When electricity passes through rarefied air it exhibits a diffused luminous stream which has all the characteristic appearances of the aurora, and hence it is highly probable that this natural phenomenon is occasioned by the passage of electricity through the upper regions of the atmosphere. The influence of the aurora upon the magnetic needle is now considered as an ascertained fact, and the connection between it and magnetism is further evident from the fact that the beams or coruscations issuing from a point in the horizon west of north are frequently observed to run in the magnetic meridian. What are known as magnetic storms are invariably connected with exhibitions of the aurora, and with spontaneous galvanic currents in the ordinary telegraph wires; and this connection is found to be so certain that, upon remarking the display of one of the three classes of phenomena, we can at once assert that the other two are also observable. The aurora borealis is said to be frequently accompanied by sound, which is variously described as resembling the rustling of pieces of silk against each other, or the sound of wind against the flame of a candle. The aurora of the southern hemisphere is quite a similar phenomenon to that of the north.

Ausculta'tion, a method of distinguishing the state of the internal parts of the body, particularly of the thorax and abdomen, by observing the sounds arising in the part, either through the immediate application of the ear to its surface, or by applying the stethoscope to the part, and listening through it. Auscultation may be used with more or less advantage in all cases where morbid sounds are produced, but its general applications are: the *auscultation* of respiration; the *auscultation* of the voice; *auscultation* of coughs; *auscultation* of sounds foreign to all these, but sometimes accompanying them; *auscultation* of the actions of the heart; obstetric *auscultation*.

Aus'sig, a town in Bohemia, near the junction of the Bila with the Elbe, 42 mi. n.n.w. of Prague; has large manufactures of woollens, chemicals, etc. Pop. 16,524.

Aus'ten, JANE (1775-1817), English novelist. Her principal novels are, *Sense and Sensibility*,

Australia

Pride and Prejudice; *Mansfield Park*; *Emma*; *Northanger Abbey*; and *Persuasion*. Her novels are marked by ease, nature, and a complete knowledge of the domestic life of the English middle classes of her time.

Aus'terlitz, a town with 3,452 inhabitants, in Moravia, 10 mi. e. of Brünn, famous for the battle of Dec. 2, 1805, fought between the French (70,000 in number) and the allied Austrian and Russian armies (95,000). The decisive victory of the French led to the Peace of Pressburg between France and Austria.

Austin, the capital of Texas and county seat of Travis county, on the north bank of the Colorado (Texas) river, 186 miles northwest of Houston. Railroads: Houston & Texas Central, International & Great Northern, and Austin & Northwestern. Manufactures: lumber, flour and grist mill products and leather. The city has an extensive wholesale trade in provisions, groceries and dry goods. It is also an important market for live stock, cotton, grain and hides. The waterworks and electric light plant are owned and operated by the city. The most prominent building is the state capitol, constructed of red granite at a cost of \$3,500,000. Austin is the seat of the State University, St. Edward's College and a number of other important schools. Pop. 1900, 22,258.

Austin, ALFRED (1835-), an English poet, born near Leeds. After graduating at the University of London, he was called to the bar, but soon gave up the law for literature. In 1896 he was made Poet Laureate of England. Among his poetical works are *English Lyrics* (1890), *Songs of England* (1900), and *A Tale of True Love and Other Poems* (1902, dedicated to Theodore Roosevelt). While his verse is graceful, it is really inferior to his prose. His critical notes in the *National Review* are interesting, and his essay *The Poetry of the Period* (1870) has attracted much attention.

Austin, STEPHEN F. (about 1790-1836), Texas pioneer and founder of the city of Austin. He led a company of colonists to Texas in 1821 and settled on a tract of land granted his father in 1820. In 1833 he was delegate to Mexico to obtain ratification of the Texan constitution. In 1835 he was made commander of the Texan Revolutionists, and went to Washington to secure the recognition of the independence of the Texan Republic by the Government of the United States. He died soon after his return.

Australasia, a geographical term meaning *Southern Asia*, and used by some authorities to denote all the islands of the Southern Pacific, including Australia, New Guinea, New Zealand and Melanesia. Others consider that Australasia comprises only Australia, Tasmania, New Zealand and the Fiji Islands.

Australia (older name, New Holland), the largest island in the world, a sea-girt continent, lying between the Indian and Pacific oceans, southeast of Asia. It is separated from New Guinea on the north by Torres Strait; from Tasmania on the south by Bass Strait. It is divided into two unequal parts by the



TYPES OF NEGRO RACES. 1. Fiji Islanders, 2. Tasmanians, 3. South Australians, 4. Maori (New Zealand), 5. New Hebrides, 6. Samoa Islanders, 7. Natives of New Ireland (Buk Island), 8. Caroline Islanders (Ponape), 9. Admiralty Islanders, 10. Tonga Islanders, 11. Natives of New Ireland, 12. Woman of Samoa Island, Papua, 13, 14. Matan Islanders, Man and Wife (Jabuit).

toothache is a common complaint, and is usually caused by inflammation of the pulp of the tooth. It is often accompanied by swelling of the gum, and by a discharge of pus from the tooth. The pain is usually sharp and shooting, and is often worse at night. It is usually relieved by the use of antiseptics, and by the removal of the pulp of the tooth.

The influence of the magnetic field on the toothache is not yet fully understood. It is known, however, that the magnetic field has a powerful effect on the circulation of the blood, and on the activity of the nerves. It is therefore possible that the magnetic field may be used to relieve the pain of toothache.

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Aus'sig, a town in the Kingdom of Prussia, in the Province of Posen, has long been famous for its glass, enamel, etc. It is situated on the river Odra.

Aus'ten, JAMES (1783-1844), an English astronomer and mathematician. He was born in London, and died in London.

Austrasia, a province of the Frankish Empire, situated in the north-east of France.

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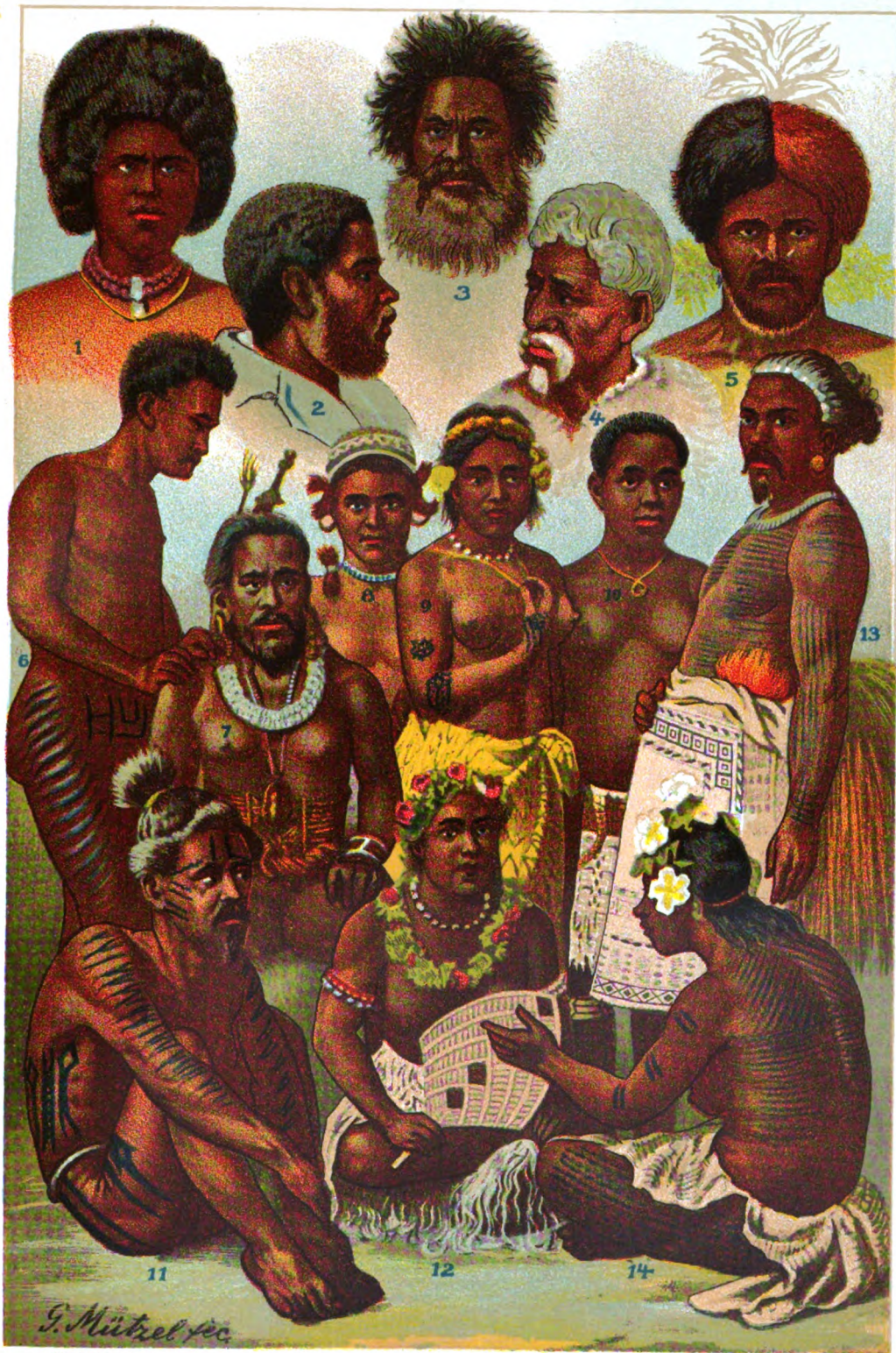
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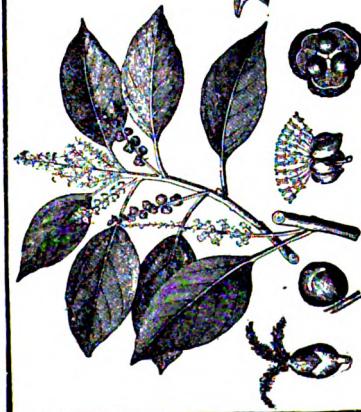
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TYPES OF AUSTRALIAN RACES. 1. Fiji Islanders. 2. Tasmanians. 3. South Australians. 4. Maori (New Zealand). 5. New Britons. 6. Samoa Islanders. 7. Natives of New Ireland (Buk Islands). 8. Carolina Islanders (Ponope). 9. Admiralty Islanders. 10. Tonga Islanders. 11. Natives of New Ireland. 12. Woman of Samoa Island, Papua. 13, 14. Marshal Islanders, Man and Wife (Jaluit).

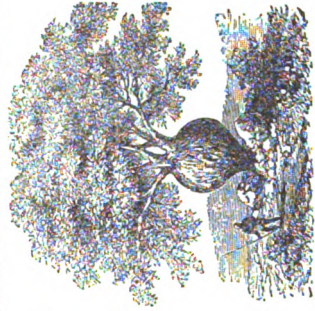
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Kamila tree (Spoonwood).



Tallow tree (East Indies).



Bottle tree.



Clove.



Black pepper.



Eucalyptus (Peppermint tree).



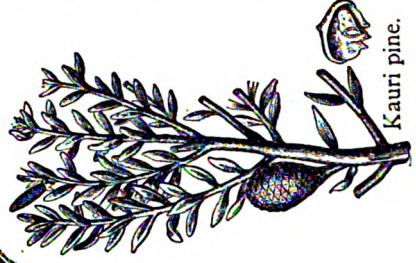
Rice plant.



Camphor.



Cinnamon.



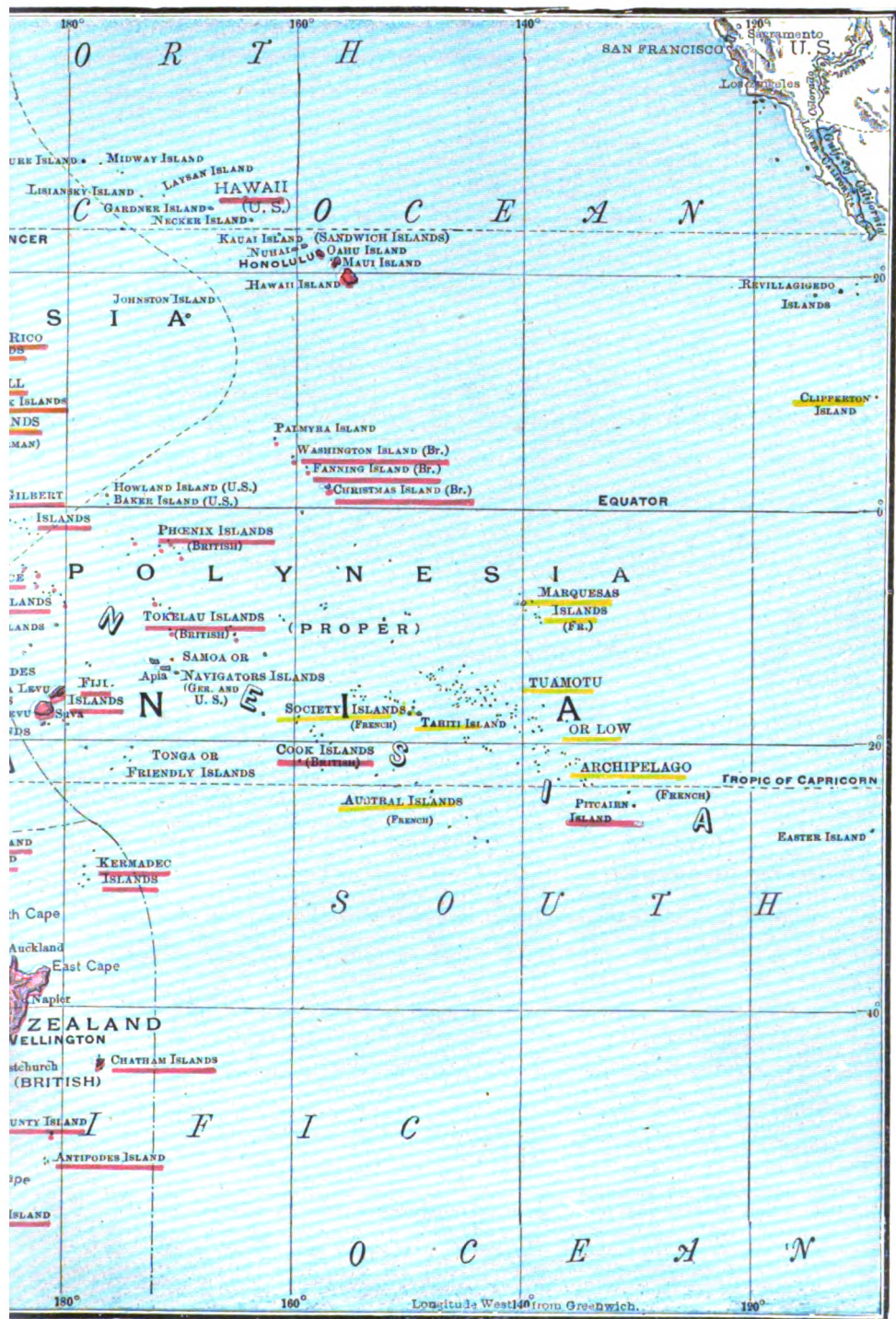
Kauri pine.



RELIEF MAP OF AUSTRALIA.

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4 24
5 25
6 26
7 27

Australia

Tropic of Capricorn, and consequently belongs partly to the South temperate, partly to the Torrid Zone.

Surface, Rivers and Lakes.—Although there are numerous spacious harbors on the coasts, there are few remarkable indentations; the principal being the Gulf of Carpentaria on the n., the Great Australian Bight and Spencer's Gulf on the s. The chief projections are Cape York Peninsula and Arnhem Land in the n. Parallel to the n.e. coast runs the Great Barrier Reef for 1,000 miles. In great part the e. coast is bold and rocky. Part of the s. coast is low and sandy, and part presents cliffs several hundred feet high. The n. and w. coasts are generally low with some elevations at intervals.

The interior is largely composed of rocky tracts of barren plains with little or no water. The whole continent forms an immense plateau, highest in the east, low in the center and with a narrow tract of land usually intervening between the elevated area and the sea. The base of the table-land is granite, which forms the surface-rock in a great part of the southwest, and is common in the higher grounds along the east side. Secondary (cretaceous) and tertiary rocks are largely developed in the interior. Silurian rocks occupy a large area in South Australia, on both sides of Spencer Gulf. The mountainous region in the southeast and east is mainly composed of volcanic, silurian, carbonaceous, and carboniferous rocks yielding good coal. The highest and most extensive mountain system is a belt about 150 mi. wide skirting the whole eastern and southeastern border of the continent. A part of it, called the Australian Alps, in the southeast, contains the highest summits in Australia; Mount Kosciusko (7,175 ft.), Mount Clarke (7,256) and Mount Townsend (7,353). West of the Dividing Range are extensive plains or downs admirably adapted for pastoral purposes. The deserts and scrubs which occupy large areas of the interior, are a characteristic feature of Australia. The former are destitute of vegetation, or are clothed only with a coarse spiny grass that affords no sustenance to cattle or horses; the latter are composed of a dense growth of shrubs and low trees.

The rivers in Australia are nearly all subject to great irregularities in volume, many of them at one time showing a channel in which there is merely a series of pools, while at another they inundate the whole adjacent country. The chief is the Murray, which, with its affluents, the Murrumbidgee, Lachlan and Darling, drains a great part of the interior west of the Dividing Range, and falls into the sea on the south coast (after entering Lake Alexandrina). Its greatest tributary is the Darling.

On the east coast are the Hunter, Clarence, Brisbane, Fitzroy, and Burdekin; on the west, the Swan, Murchison, Gascoyne, Ashburton, DeGrey; on the north, the Fitzroy, Victoria, Flinders and Mitchell. A considerable river of the interior is Cooper's Creek, or the Barcoo, which falls into Lake Eyre, one of a

Australia

group of lakes on the south side of the continent, having no outlet and accordingly salt. The principal of these are Lake Eyre, Torrens and Gairdner, all of which vary in size and saltiness according to the season. Another large salt lake of little depth, Lake Amadeus, lies a little west of the center of Australia.

Climate.—The climate of Australia is generally hot and dry, but very healthy. In the tropical portions there are heavy rains, and in most of the coast districts there is a sufficiency of moisture, but in the interior the heat and drought are extreme. Considerable portions now devoted to pasturage are liable at times to suffer from drought. At Melbourne the mean temperature is about 56°, at Sydney about 63°. The southeastern settled districts are at times subject to excessively hot winds from the interior, which cause great discomfort, and are often followed by a violent cold wind from the south ("southerly bursters"). In the mountainous and more temperate parts snow-storms are common in winter (June, July and August).

Vegetation.—The Australian flora presents peculiarities which mark it off by itself in a very decided manner. Many of the most striking features have an unmistakable relation to the general dryness of the climate. The trees and bushes have for the most part a scant foliage, presenting little surface for evaporation, or thick leathery leaves well fitted to retain moisture. The most widely-spread types of Australian vegetation are the various kinds of gum-tree, the shea-oak, the acacia or wattle, the grass-tree, many varieties of proteaceae, and a great number of ferns and tree ferns. Of the gum-tree there are found upward of 150 species, many of which are of great value. Individual specimens of the "peppermint" have been found to measure from 480 to 500 ft. in height. As timber trees the most valuable members of this genus are the red-gum, the timber of which is hard, dense and almost indestructible. A number of the gum-trees have deciduous bark. The wattle or acacia includes about 300 species, some of them of considerable economic value, yielding good timber or bark for tanning. The most beautiful and most useful is that known as the golden wattle, which in spring is adorned with rich masses of fragrant yellow blossom. Palms—of which there are 24 species all except the cocoa palm peculiar to Australia—are confined to the s. and e. coasts. In the "scrubs" already mentioned hosts of densely inter-twisted bushes occupy extensive areas. The mallee scrub is formed by a species of dwarf eucalyptus, the mulga scrub by a species of thorny acacia. A plant which covers large areas in the arid regions is the spinifex or porcupine grass, a hard, coarse and excessively spiny plant, which renders traveling difficult, wounds the feet of horses and is utterly uneatable by any animal. Australia possesses great numbers of turf-forming grasses, such as the kangaroo-grass, which survives even a tolerably protracted drought. The native fruit trees are few and unimpor-

Australia

tant, and the same may be said of the plants yielding roots used as food. The vine, the olive, and the mulberry thrive well, and quantities of wine are now produced. The cereals of Europe and maize are extensively cultivated and large tracts of country, particularly Queensland, are under the sugar-cane.

Zoology.—The Australian fauna is almost unique in its character. Its great feature is the nearly total absence of all the forms of mammalia which abound in the rest of the world, their place being supplied by a great variety of marsupials—these animals being nowhere else found, except in the opossums of America. There are about 110 kinds of marsupials (of which the kangaroo, wombat, bandicoot and phalangers or opossums, are the best known varieties), over 20 kinds of bats, a wild dog (the dingo) and a number of rats and mice. Two extraordinary animals, the platypus, or water-mole of the colonist (*Ornithorhynchus*) and the porcupine ant-eater (*Echidna*) constitute the lowest order of mammals (*Monotremata*) and are confined to Australia. Their young are produced from eggs. Australia now possesses a large stock of domestic animals which thrive there remarkably well. The breed of horses is excellent. Horned cattle and sheep are largely bred, the first attaining a great size, while the sheep improve in fleece and their flesh in flavor. There are upward of 650 different species of birds, the largest being the emu, or Australian ostrich, and a species of cassowary. Peculiar to the country are the black swan, the honey-sucker, the lyre bird, the brush turkey, and other mound-building birds, the bower birds, etc. The parrot tribe preponderates over most other groups of birds on the continent. There are many reptiles, the largest being the alligator, found in some of the northern rivers. There are upward of 60 different species of snakes, some of which are very venomous. Lizards, frogs and insects are also numerous in various parts. The seas, rivers and lagoons abound in fish of numerous varieties, and other aquatic animals, many of them peculiar. Whales and seals frequent the coasts. On the n. coasts are extensive fisheries of trepang, much visited by native traders from the Indian Archipelago. Some animals of European origin, such as the rabbit and the sparrow, have developed into real pests in several of the colonies.

Population.—According to the census of 1901, the total population of the Commonwealth of Australia, including the Island of Tasmania, is 3,777,222, a gain since 1891 of 593,975. About 30,000 of these are native races. The natives of Australia belong to the Australian negro stock and are sometimes considered the lowest as regards intelligence in the whole human family. They are of a dark brown, or black color, curly, but not woolly hair, of medium size, but inferior muscular development. In the settled parts of the continent they are inoffensive, and rapidly dying out. They have no fixed habitations; in the summer they live almost entirely in the open air, and in the more inclement weather they shel-

Australia

ter themselves with bark erections of the rudest construction. They have no cultivation and no domestic animals. Their food consists of such animals as they can kill, and no kind of living creature seems to be rejected—snakes, lizards, frogs and even insects being eaten, often half raw. They are ignorant of the potter's art. In their natural condition they wear little or no clothing. The women are regarded merely as slaves and are frightfully maltreated. They have no religion; they practice polygamy, and are said to sometimes resort to cannibalism, but only in exceptional circumstances. They are occasionally employed by the settlers in light kinds of work, and as horse-breakers; they dislike continuous occupation and soon give it up. The weapons of all the tribes are generally similar, consisting of spears, shields, boomerangs, wooden axes, clubs and stone hatchets. Of these the boomerang is the most singular, being an invention confined to the Australians. There are large numbers of Chinese in the commonwealth.

Commerce and Industry.—Pastoral, agricultural pursuits and mining are the chief occupations of the people, though in recent years manufactures and handicrafts have employed constantly increasing numbers. Australia contains vast quantities of mineral wealth. Foremost come its rich and extensive deposits of gold, which since the precious metal was first discovered in 1851, have produced a total of more than \$1,500,000,000. The greatest quantity has been obtained in Victoria, but New South Wales and Queensland have also yielded a considerable amount. Australia also possesses silver, copper, tin, lead, zinc, antimony, mercury, plumbago, besides coal and iron. Various precious stones are found, as the garnet, ruby, sapphire and some diamonds. The building stone comprises granite, limestone, marble and sandstone.

For sheep rearing and the growth of wool Australia is unrivaled and its production is constantly on the increase. Next to wool come in importance gold, tin, copper, wheat, preserved meats, tallow, hides and skins, cotton, tobacco, cigars, and wine as the most important items of export. The chief imports consist of textile fabrics, clothing, machinery and metal goods.

History.—It is doubtful when Australia was first discovered. Between 1531 and 1542 the Portuguese published the existence of a land which they called Great Java, and which corresponded to Australia, and probably the first discovery of the country was made by them early in the sixteenth century. The first authenticated discovery is said to have been made in 1601, by a Portuguese named Manoel Godinho de Eredia. In 1606 Torres, a Spaniard, passed through the strait that now bears his name, between New Guinea and Australia. Between this period and 1628 a large portion of the coast line of Australia had been surveyed by various Dutch navigators. In 1664 the continent was named New Holland by the Dutch government. In 1688



Orang utan (Borneo) (137).



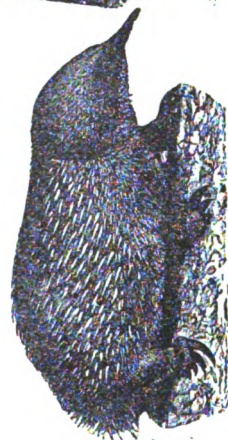
Flying fox (138).



Kangaroo bear (139).



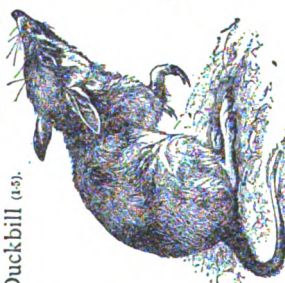
Black leopard (140)
(Java and Sumatra)



Spiny ant-eater (141).



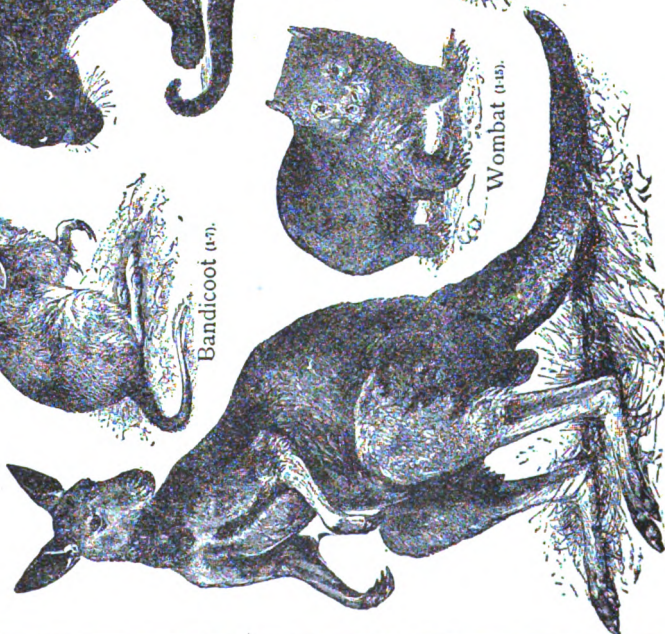
Duckbill (142).



Bandicoot (143).



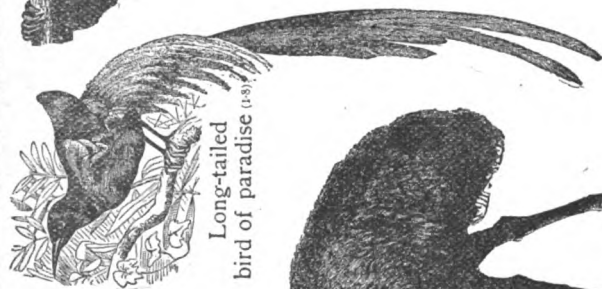
Wombat (144).



Kangaroo (145).



Bush turkey (112).



Long-tailed
bird of paradise (113).



Flying fox (114).



Pigeon goose (115).



Emu (116).



Lyre bird (117).



King bird of paradise (118).



Black swan (119).



Crocodile (120).

Australia

Dampier coasted along part of Australia, and about 1700 explored a part of the w. and n. w. coasts. In 1770 Cook carefully surveyed the e. coast, named a number of localities, and took possession of the country for Britain. He was followed by Bligh in 1789, who carried on a series of observations on the n.e. coast, adding largely to the knowledge already obtained of this new world. Colonists had now arrived on the soil, and a penal settlement was formed (1788) at Port Jackson. In this way was laid the foundation of the future colony of New South Wales. The Moreton Bay district (Queensland) was settled in 1825; in 1835 the Port Philip district. In 1851 the latter district was erected into a separate colony under the name of Victoria. Previous to this time the colonies both of Western Australia and of South Australia had been founded—the former in 1829, the latter in 1836. The latest of the colonies is Queensland, which only took an independent existence in 1859. The discovery of gold in abundance took place in 1851, and caused an immense excitement and great influx of immigrants. The population was then only about 350,000, and was slowly increasing; but the discovery of the precious metal started the country on that career of prosperity which has since been almost uninterrupted. Convicts were long sent to Australia from the mother country, but transportation to New South Wales practically ceased in 1840, and the last convict vessel to West Australia arrived in 1868. Altogether about 70,000 convicts were landed in Australia (besides almost as many in Tasmania).

The record of interior exploration forms an interesting part of Australian history. This has been going on since early in the century, and is yet far from complete. There is still a large area of the continent of which little or nothing is known, comprising especially a vast territory belonging to Western Australia, and a portion of South Australia. Among the men who have won fame in the field of Australian exploration are Oxley (1817-23), who partly explored the Lachlan and Macquarie, discovered the Brisbane, etc.; Hume and Hovell (1824), who crossed what is now the colony of Victoria from north to south; Cunningham (1827), who discovered the Darling Downs; Sturt (1828-29), who examined the Macquarie, part of Darling, and the Murrumbidgee, which he traced to the Murray, sailing down the latter to Lake Alexandrina, in 1814 penetrating to near the middle of the continent from the south; Mitchell (1831-36) made extensive explorations in N. S. Wales and Victoria; M'Millan (1839) explored and traversed Gippsland; Eyre (1840) traveled by the coast from Adelaide to King George's Sound; Leichhardt in 1844-45 traveled from Brisbane to Port Essington, discovering fine tracts of territory and the numerous rivers flowing into the Gulf of Carpentaria; in 1848 he was lost in the northern interior, in attempting to cross Australia from east to west, and nothing further regarding his fate has been discovered; Kennedy (1848) was killed in ex-

Australia

ploring Cape York Peninsula; A. C. Gregory (1855-56) explored part of northwestern Australia, and crossed from that to the Brisbane district, an important exploring journey; M'Douall Stuart (1859-60-62) crossed the continent from south to north and back again nearly in the line of the present overland telegraph; Burke, Wills, Gray, and King (1860-61) crossed from Melbourne to the Gulf of Carpentaria, but Burke, Wills, and Gray perished on the return journey; F. T. Gregory (1861) explored the region of the Ashburton, Fortescue, and other rivers of n. w. Australia; Warburton (1873) traveled with camels from the center of the continent to the n. w. coast; J. Forrest (1874) made an important journey in Western Australia; Giles (1874-76) explored central Western Australia; Favenc (1878-79) traveled from Brisbane to Port Darwin; A. Forrest (1879) explored part of northern Australia; Mills (1883) traversed with camels a considerable stretch of new ground in Western Australia; Winnicke (1883-84), also with camels, explored and mapped about 40,000 sq. mi. of the unknown interior.

Federation Completed in 1900.—The five colonies of Australia and the island of Tasmania were federated in 1900 under the name of the Commonwealth of Australia. The six divisions are known as states.

The negotiations which finally resulted in federation extended through a period of nearly fifty years. Agitation for federation began as early as 1852, when a proposal was made for the establishment of a general assembly to make laws in relation to intercolonial questions. The proposition was, however, involved with others of a more doubtful nature, and consequently sank out of sight, until, as a result of an Intercolonial Conference, the matter came before the British parliament, and a measure was passed permitting the formation of a Federal Council, to which any colony could send delegates. The first meeting of the Federal Council was held at Hobart, Tasmania, in January, 1886. The colonies represented were Victoria, Queensland, Tasmania, Western Australia, and Fiji. South Australia was not represented at this conference, but sent delegates to a subsequent meeting.

As this council was only a deliberative body, it could accomplish nothing of a permanent nature. In 1890, a conference consisting of representatives of each of the colonies of Australia was held in Melbourne, and it was resolved that steps should be taken toward the appointment of delegates to a constitutional convention. This convention met at Sydney, March 2, 1891, and drafted a constitution very similar to the one which was finally adopted. The convention resolved that the colonial parliaments should submit this draft to the people, and when at least three of the colonies should adopt it, it should be referred to the British parliament for approval. Strenuous opposition blocked every step toward federation, and for several years all definite progress was checked. The colonial parliaments failed to

Australia

act in the matter, and it became evident that federation would have to be made a popular issue, if it were to be brought about. Consequently the friends of federation formed several leagues which carried on an active campaign for a federal union. A convention of these leagues in 1893 decided to urge the colonial parliaments to authorize the calling of a new constitutional convention, the delegates to be chosen by popular suffrage. In accordance with this plan, five of the colonial premiers met at Hobart in 1895, and drafted an act for such a convention, which was to be submitted to the legislatures of the five colonies they represented. A draft of a constitution was to be drawn up, and was then to be submitted to the several colonial legislatures for discussion and for amendments, the draft finally to be submitted to the vote of the people. After another delay of two years, the convention met at Adelaide in 1897, all the colonies except New Zealand and Queensland being represented.

A constitution based upon that of 1891 was drawn up, and in 1898 it was submitted to a vote of the people. It was provided that each colony should fix a minimum for the affirmative vote, and that if any three of the colonies ratified the constitution, application might be made to the British parliament for an enabling act. Federation was fought in the parliament of New South Wales, and the minimum was raised from 50,000 to 80,000, and the measure was defeated. West Australia, which early in the agitation for federation made her acceptance of federation conditional upon New South Wales being one of the states of the Commonwealth, cast no vote, nor did Queensland. As two of the three colonies voting in the affirmative were unimportant, no application for an enabling bill was made. New South Wales did not favor federation, because as the parent colony she was unwilling to place herself on an equal footing with the newer colonies, and with Victoria and Queensland, offshoots of New South Wales. The latter desired also to have full control of the New South Wales rivers, to have the capital located within that colony, and the payment of bounties by the individual states and not by the federal government. The refusal of the other colonies to accede to the demands of New South Wales served to check federation for some time.

In January, 1899, the premiers of Queensland, Victoria, West Australia, and Tasmania met at Melbourne, and agreed to modify the plan for federation so that it would be acceptable. The plan as changed met with approval, and in June, when a vote was taken on the federation in New South Wales, the majority in favor was over 20,000. Before the end of 1899, Tasmania, Victoria, South Australia, and Queensland had voted favorably for federation. The only step then required to consummate the scheme for federation was a bill in the British parliament to give it effect.

The enabling bill was introduced in the British Parliament May 14, 1900, and was

Australia

promptly passed. On July 19, Queen Victoria formally approved the selection of the Earl of Hopetoun, K. T., G. C. M. G., P. C., as governor-general of the Commonwealth of Australia.

Early in August, West Australia finally adopted the Commonwealth bill and thus completed the federation of the Australian states. The Island of New Zealand, which was originally interested in the plan of federation, did not vote upon the proposition, and, therefore, is not one of the states of the Commonwealth. The new government was installed Jan. 1, 1901.

The Duke and Duchess of York carried King Edward's commission to open the first parliament of the Australian Commonwealth May 9, 1901.

Character of the Constitution.—The official title of the federated colonies is the Commonwealth of Australia, and its component parts are known as states. The executive power is vested in a governor-general—to be appointed by the Crown—assisted by a Federal Executive Council. The parliament is to consist of two houses—the senate and the house of representatives—both to be elected by the people on the franchise existing in the various states at the time of federation. The senators are elected for a term of six years, and the representatives for a period of three years. Every state that joined the federation at its inception is entitled to an equal representation of six members in the senate; and it is provided that half the number of senators shall retire every three years, but shall be eligible for re-election. The number of members of the house of representatives is to be, as near as possible, twice the number of senators, the states to be represented in proportion to population, and it was provided that the states entering the Federation at the time of its establishment shall have at least five representatives. The federal parliament has power to alter the franchise on which its members are elected, but only in the direction of the extension of the voting powers of the people. The salaries of both senators and representatives is fixed at \$2,000.

The federal government assumes the administration of the departments of customs and excise, and, as soon as possible, shall take over from the states, posts and telegraphs, naval and military defense, lighthouses, lightships, beacons and buoys, and quarantine; and shall have exclusive power of dealing with these services. Power is also given to the federal authority to deal with a large number of other matters of government, but only the services specified are to be transferred without further legislation. Within two years of the establishment of the Commonwealth a uniform customs and excise tariff is to be imposed by the federal government, and intercolonial trade will then be absolutely free. The federal government is required to raise from customs and excise, though other sources of taxation are left open, four times the amount required for its own purposes, and return the excess to the local

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treasuries. This repayment will for the first five years be in proportion to the contributions of the states, and afterwards as the parliament may decide. With the consent of the states, the central government may take over the state railways, and also the state debts, paying interest out of the surplus customs and excise revenue. An interstate commission is established for the administration of the laws relating to interstate trade.

The two branches of parliament have equal powers in originating bills, except that only the lower house may originate bills appropriating or imposing taxation. The senate does not have power to amend such bills, but may return them to the house with suggestions for amendments, but such suggestions are in no way binding upon the house. If bills, other than money bills, have twice been passed by the house of representatives and twice been rejected by the senate, the two houses may be simultaneously dissolved, and if, after the new election, they still disagree, the bill in dispute must be submitted to the members of the two houses in joint session, and can become law only if passed by a majority of three-fifths of the members present and voting.

The constitution provides for a high court of justice, which may hear appeals from all federal courts, from the supreme courts of the states, and from the interstate commission. The right of appeal from the high court of Australia to the King-in-Council is permitted in cases in which other than purely Australian interests are concerned, and also in cases where purely Australian interests are involved, provided both parties concerned consent to it. In all other cases affecting Australian interests alone, it is left with the federal parliament to permit or prohibit appeal.

This particular clause was insisted upon by the Australians and it was accepted by parliament only after considerable debate.

The Federal Constitution can only be amended by an absolute majority of the members of each house, and the amendment shall become law, if it is accepted by a majority of the people of the Commonwealth and by a majority of the states.

Australian Star-flower. See *Burbank, Luther*. **Austrasia**, or the East Kingdom, the name given, under the Merovingians, to the eastern possessions of the Franks, embracing Lorraine, Belgium, and the right bank of the Rhine, and having their central point at Metz. At the time of the rise of the Frankish power, these districts were of great importance, as they formed the connection with the German mother-country, and were the most thickly inhabited by Franks. Under Charlemagne's successor, Austrasia merged into Germany; and Neustria, or West Frank-land, into France.

Austria, the usual name of the great empire now officially called the Austro-Hungarian Monarchy, is a Latinized form of the German *Oesterreich* (Fr. *Autriche*), meaning "Eastern Kingdom."

Austria is an extensive duplex monarchy in

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Central Europe, inhabited by several distinct nationalities, and consisting of two semi-independent countries, each with its own parliament and government, but with one common sovereign, army, and system of diplomacy, and also with a common parliament. The Austrian Empire now has a total area of about 240,000 sq. mi., and is bounded s. by Turkey, the Adriatic, and Italy; w. by Switzerland, Bavaria, and Saxony; n. by Prussia and Russian Poland; and e. by Russia and Roumania. On the shores of the Adriatic, along the coasts of Dalmatia, Croatia, Istria, etc., lies its only sea frontage, which is of comparatively insignificant extent. Besides the two great divisions of Austria proper, or "Cisleithan" Austria and Hungary or "Transleithan" Austria, the Austro-Hungarian monarchy is divided into a number of governments or provinces, as follows:—

AUSTRIAN PROVINCES.—Lower Austria, Upper Austria, Salzburg, Styria, Carinthia, Carniola, Trieste, Görz, Gradiska, Istria, Tyrol, Vorarlberg, Bohemia, Moravia, Silesia, Galicia, Bukowina, and Dalmatia.

HUNGARIAN PROVINCES.—Hungary, Transylvania, Croatia, Slavonia, and Fiume.

The est. pop. in 1900 was 40,464,808. The largest cities are Vienna, Budapest, Prague, Lemberg, Gratz, Brunn, Szegedin, Trieste, Cracow, Bosnia, and Herzegovina, formerly Turkish, but now under the administration of Austria, have an area of 19,728 sq. mi.; pop. 1,336,091.

The prevailing character of the Austrian dominions is mountainous or hilly, the plains not occupying more than a fifth part of the whole surface. The loftiest ranges belong to the Alps, and are found in Tyrol, Styria, Salzburg, and Carinthia, the highest summits being the Ortlerspitzen (12,814 ft.) on the western boundary of Tyrol, and the Grosslockner (12,300) on the borders of Salzburg, Tyrol, and Carinthia. Another great range is that of the Carpathians, bounding Hungary on the north. The most extensive tracts of low or flat land, much of which is very fertile, occur in Hungary, Galicia, and Slavonia, the great Hungarian plain having an area of 36,000 sq. mi. They stretch along the courses of the rivers, of which the chief are the Danube, with its tributaries (the Save, the Drave, the Theiss, the Maros, the Waag, the March, the Raab, the Inn); also the Elbe and Moldau and the Dniester. The Danube for upward of 800 mi. is navigable for pretty large vessels; the tributaries also are largely navigable. The lakes are numerous and often picturesque, the chief being Lake Balaton or the Plattensee. The climate is exceedingly varied, but generally good. The principal products of the north are wheat, barley, oats, and rye; in the center vines and maize are added; and in the south olives and various fruits. The cereals grow to perfection, Hungarian wheat and flour being celebrated. Other crops are hops, tobacco, flax, and hemp. Wine is largely made, but the wines are inferior on the whole, with ex-

Austria

ception of a few kinds, including Tokay. The forests cover 70,000 sq. mi., or one third of the productive soil of the empire. Sheep and cattle are largely reared. Wild deer, wild swine, chamois, foxes, lynxes, and a species of small black bear are found in many districts, the fox and lynx being particularly abundant. Herds of a small native breed of horses roam wild over the plains of Hungary. In mineral productions Austria is very rich, possessing, with the exception of platinum, all the useful metals, the total annual value of the mineral products of the Austrian Empire being estimated at upward of \$60,000,000, the principal being coal, salt, and iron.

Manufactures are in the most flourishing condition in Bohemia, Moravia, Silesia, and Lower Austria; less so in the eastern provinces, and insignificant in Dalmatia, Bukovina, Herzegovina, etc. Among the most important manufactures are those of machinery and metal goods, Austria holding a high place for the manufacture of musical and scientific instruments, gold and silver plate, and jewelry; of stone and china-ware, and of glass, which is one of the oldest and most highly developed industries in Austria; of chemicals; of sugar from beet; of beer, spirits, etc., and especially the manufactures of woolen, cotton, hemp, and flax. The manufacture of tobacco is in a state monopoly. Tanning is carried on to a great extent, and in the production of gloves (in Vienna and Prague), Austria stands next to France.

In addition to the general import and export trade Austria carries on a very considerable amount of business in the transit of goods through her territory. In 1889 the total value of imports into Austria-Hungary was 589,000,000 florins; of exports, 766,000,000 florins; the value of imports in 1890, 610,000,000 florins; exports, 771,000,000 florins. Among imports are cotton and other fibers, textile goods and yarn, metals, machinery, drugs, chemicals, oils, fats, hides, skins, etc. The chief exports are cereals, animals, metallic goods, woven fabrics, pottery, and glass manufactures. Nearly two thirds of the commerce is with Germany, next in importance being the trade with Roumania, Italy, and Russia. The exports direct to the United Kingdom in 1890 were \$8,641,685; the imports of British produce thence, \$6,416,045; these amounts do not include indirect exports and imports through other countries. The staple export to the United Kingdom is corn and flour. The chief imports from it are cotton manufactures, machinery, and metals, woolen goods, fish, etc. The mercantile navy of Austria has a total burden of about 325,000 tons. The principal ports are Trieste, Pola, and Fiume. There are about 14,000 miles of railway open. Accounts are kept in gulden or florins of 100 kreutzers each, the florin being nominally=fifty cents. Practically the chief medium of exchange is banknotes. The Austrian *centner* or hundredweight =123½ lbs. avoirdupois; the *metze*, the largest

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dry measure=1.7 bushel; the *eimer*=14.94 wine gallons; the *joch* of land=1.43 acres.

None of the European states except Russia exhibits such a diversity of race and language as the Austrian Empire. The Slavs—who differ greatly, however, among themselves in language and civilization—amount to above 16,000,000, or 45 per cent. of the total population, and form the great mass of the population of Bohemia, Moravia, Carniola, Galicia, Dalmatia, Croatia, and Slavonia, and northern Hungary, and half the population of Silesia and Bukovina. The Germans, about 9,000,000, form almost the sole population of the archduchy of Austria, Salzburg, the greatest portion of Styria and Carinthia, almost the whole of Tyrol and Vorarlberg, large portions of Bohemia and Moravia, the whole of west Silesia, etc.; and they are also numerous in Hungary and Transylvania. The Magyars or Hungarians (6,300,000) form the bulk of the inhabitants of the kingdom of Hungary and eastern Transylvania. Of the Italic or western Romanic stock there are about 700,000, and in the southeast about 2,500,000 of the Roumanian or eastern Romanic stock. The number of Jews is above 1,000,000; and there are other races, such as the Gypsies (150,000), who are most numerous in Hungary and Transylvania, and the Albanians in Dalmatia and the adjacent parts. The total population, according to the census of 1901, is 46,900,835.

The state religion of Austria is the Roman Catholic, but the civil power exercises supreme control in all ecclesiastical matters. In 1890 there were in the Austrian portion of the monarchy 18,934,000 Roman Catholics, 2,814,000 Greek Catholics united to the Roman Church, 493,542 non-united, 436,000 Protestants, and 1,143,000 Jews. In Hungary and Transylvania there were 6,478,731 Roman Catholics, 1,486,903 Greek united, and 1,931,276 non-united, 3,139,758 Protestants, and 624,680 Jews.

The intellectual culture of the people is highest in the German provinces, but in some of the other provinces the illiterates number as many as 80 to 90 per cent. Yet for a number of years attendance on the elementary schools has been compulsory on all children from their sixth to the end of their twelfth year; and there are higher schools on which attendance is compulsory for young people of thirteen to fifteen years (not elsewhere educated). There are numerous gymnasia and "real-schools," the gymnasia being intended chiefly to prepare pupils for the universities, while in the real-schools a more practical end is kept in view, and modern languages and physical science form the groundwork of the educational course; also agricultural, commercial, industrial, art, music, and other special schools. There are eleven universities; viz., in Vienna, Prague (2), Budapest, Gratz, Cracow, Lemberg, Innsbruck, Klausenburg, Agram, and Czernowitz. Most of these have four fac

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ulties—Catholic theology, law and politics, medicine, and philosophy.

The ruler of the Austro-Hungarian monarchy has the title of emperor so far as concerns his Austrian dominions, but he is only king of Hungary. All matters affecting the joint interests of the two divisions of the empire, such as foreign affairs, war, and finance, are dealt with by a supreme body known as the Delegations—a parliament of 120 members, one half of whom are chosen by and represent the legislature of German-Austria, and the other half that of Hungary. The legislative center of the Austrian division of the empire is the Reichsrath, or council of the realm, consisting of an upper house (Herrenhaus), composed of princes of the imperial family, nobles with the hereditary right to sit, archbishops, and life-members nominated by the emperor; a lower house (Abgeordnetenhaus) of 353 elected deputies. There are seventeen provincial diets or assemblies, each provincial division having one. In the Hungarian division of the empire the legislative power is vested in the king and the diet or Reichstag conjointly, the latter consisting of an upper house or house of magnates and of a lower house or house of representatives, the latter elected by all citizens of full age paying direct taxes to the amount of \$4 a year. The powers of the Hungarian Reichstag correspond to those of the Reichsrath of the Cisleithan provinces. There being three distinct parliaments in the empire, there are also three budgets; viz., that for the whole empire, that for Cisleithan, and that for Transleithan Austria. A small portion of the imperial revenue of Austria is derived from customs and other sources, 70 per cent. of the remainder being made up by the Cisleithan and 30 per cent. by the Transleithan divisions of the empire.

Military service is obligatory on all citizens capable of bearing arms who have attained the age of twenty. The period of service is twelve years, of which three are passed in the line, seven in the reserve, and two in the landwehr. The army numbers over 290,000 men (including officers) on the peace-footing and over 1,500,000 on the war-footing. The most important portion of the Austrian navy comprises 12 iron-clads, of from 5 to 14-inch armor, the largest having a tonnage of over 7,000, and carrying 27-ton guns; besides gun-boats, torpedo vessels, and other vessels, mostly small and intended for coast defense. The crews number about 10,000 officers and men.

History.—In 791 Charlemagne drove the Avars from the territory between the Ens and the Raab, and united it to his empire under the name of the *Eastern Mark* (that is, March or boundary land); and from the establishment by him of a margravate in this new province the present empire took its rise. On the invasion of Germany by the Hungarians it became subject to them from 900 till 955, when Otho I. by the victory of Augsburg, reunited a great part of this province to the German Empire, which by 1043 had extended its limits to the Leitha. The margravate of Austria was

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hereditary in the family of the counts of Babenberg (Bamberg) from 982 till 1156, in which year the boundaries of Austria were extended so as to include the territory above the Ens, and the whole was created a duchy. The territory was still further increased in 1192 by the gift of the duchy of Styria as a fief from the Emperor Henry VI, Vienna being by this time the capital. The male line of the house of Babenberg became extinct in 1246, and the Emperor Frederick II declared Austria and Styria a vacant fief, the hereditary property of the German emperors. In 1282 the emperor Rudolph granted Austria, Styria, and Carinthia, to his two sons, Albert and Rudolph. The former became sole ruler (duke), and since then Austria has been under the still reigning house of Hapsburg. Albert, who was an energetic ruler, was elected emperor in 1298, but was assassinated in 1308. The first of his successors we need specially mention, was Albert V, son-in-law of the Emperor Sigismund. He assisted Sigismund in the Hussite wars, and was elected after his death king of Hungary and of Bohemia, and German emperor (1438). Ladislaus, his posthumous son, was the last of the Austrian line proper, and its possessions devolved upon the collateral Styrian line in 1457; since which time the house of Austria furnished an unbroken succession of German emperors.

In 1453 the Emperor Frederick III, a member of this house, had conferred upon the country the rank of an archduchy before he himself became ruler of all Austria. His son, Maximilian I, by his marriage with Mary, the surviving daughter of Charles the Bold, united the Netherlands to the Austrian dominions. After the death of his father in 1493 Maximilian was made emperor of Germany, and transferred to his son Philip the government of the Netherlands. He also added to his paternal inheritance Tyrol, with several other territories, particularly some belonging to Bavaria, and acquired for his family new claims to Hungary and Bohemia. The marriage of his son Philip to Joanna of Spain raised the house of Hapsburg to the throne of Spain. Philip, however, d. in 1506, and the death of Maximilian in 1519 was followed by the union of Spain and Austria; his grandson (the eldest son of Philip), Charles I, king of Spain, being elected emperor of Germany as Charles V. Charles thus became the greatest monarch in Europe, but in 1521 he ceded to his brother Ferdinand all his dominions in Germany. Ferdinand I, by his marriage with Anna, the sister of Louis II, king of Hungary, acquired the kingdoms of Hungary and Bohemia, with Moravia, Silesia, and Lusatia, the appendages of Bohemia. To oppose him the waywode of Transylvania, John Zapolya, sought the help of the sultan, Solymán II, who appeared in 1529 at the gates of Vienna, but was compelled to retreat. In 1535 a treaty was made by which John von Zapolya was allowed to retain the royal title and half of Hungary, but after his death new disputes arose, and Ferdinand maintained the possession of Lower Hungary only

by paying Solyman the sum of 30,000 ducats annually (1562). In 1556 Ferdinand obtained the imperial crown, when his brother Charles laid by the scepter for a cowl. He died in 1564, leaving his territories to be divided among his three sons.

Maximilian II, the eldest, succeeded his father as emperor, obtaining Austria, Hungary, and Bohemia; Ferdinand, the second son, received Tyrol and Hither Austria; and Charles, the youngest, obtained Styria, Carinthia, Carniola, and Gorz. Maximilian d. in 1576, and was succeeded on the imperial throne by his eldest son Rudolph II, who had already been crowned king of Hungary in 1572, and king of Bohemia in 1575. Rudolph's reign was distinguished by the war against Turkey and Transylvania; the persecutions of the Protestants, who were driven from his dominions; the cession of Hungary in 1608; and in 1611 of Bohemia and his hereditary estates in Austria to his brother Matthias. Matthias, who succeeded Maximilian on the imperial throne, concluded a peace with the Turks, but was disturbed by the Protestant Bohemians, who took up arms in defense of their religious rights, thus commencing the Thirty Years' War. After his death in 1619 the Bohemians refused to acknowledge his successor, Ferdinand II, until after the battle of Prague in 1620, when Bohemia had to submit, and was deprived of the right of choosing her king. Lutheranism was strictly forbidden in all the Austrian dominions. Hungary, which revolted under Bethlen Gabor, prince of Transylvania, was, after a long struggle, subdued. During the reign of Ferdinand III (1637-57), successor of Ferdinand II, Austria was continually the theater of war; Lusatia was ceded to Saxony in 1635; and Alsace to France in 1648, when peace was restored in Germany by the Treaty of Westphalia.

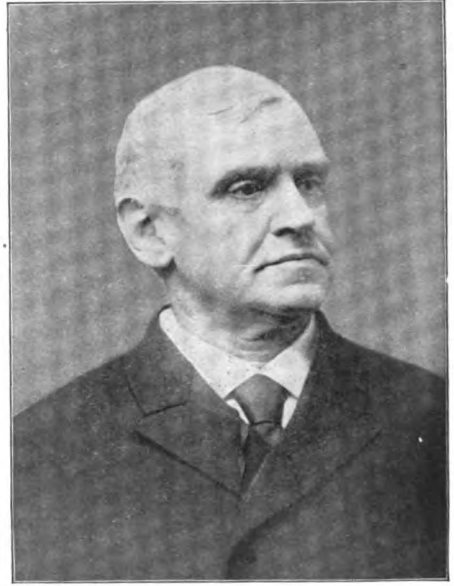
The emperor, Leopold I, son and successor of Ferdinand III, was victorious through the talents of Eugene in two wars with Turkey; and Vienna was delivered by Sobieski and the Germans from the attacks of Kara Mustapha in 1683. In 1687 he united Hungary to Transylvania, and in 1699 restored to Hungary the country lying between the Danube and the Theiss. It was the chief aim of Leopold to secure to Charles, his second son, the inheritance of the Spanish monarchy, and in 1701, upon the victory of French diplomacy in the appointment of the grandson of Louis XIV, the War of the Spanish Succession began. Leopold d. in 1705, but Joseph I, his eldest son, continued the war. As he d. without children in 1711, his brother Charles was elected emperor, but was obliged to accede in 1714 to the Peace of Utrecht, by which Austria received the Netherlands, Milan, Mantua, Naples, and Sardinia. In 1720 Sicily was given to Austria in exchange for Sardinia. This monarchy now embraced over 190,000 sq. mi.; but its power was weakened by new wars with Spain and France. In the peace concluded at Vienna (1735 and 1738) Charles VI was forced to cede Naples and Sicily to Spain and part of

Milan to the king of Sardinia, and in 1739, by the Peace of Belgrade, he was obliged to transfer to the Porte, Belgrade, Servia, etc., partly in order to secure the succession to his daughter Maria Theresa by the Pragmatic Sanction. He d. in 1740.

On the marriage of Maria Theresa with Stephen, the duke of Lorraine (the dynasty henceforth being that of Hapsburg-Lorraine), and her accession to the Austrian throne, the empire was threatened with dismemberment. Frederick II of Prussia subdued Silesia; the elector of Bavaria was crowned in Linz and Prague, and in 1742 chosen emperor under the name of Charles VII; Hungary alone supported the heroic and beautiful queen. Charles, however, d. in 1745, and the husband of Theresa was crowned emperor of Germany as Francis I; but a treaty concluded in 1745 confirmed to Frederick the possession of Silesia, and by the Peace of Aix-la-Chapelle, 1748, Austria was obliged to cede the duchies of Parma, Piacenza, and Guastalla to Philip, Infant of Spain, and several districts of Milan to Sardinia. To recover Silesia, Maria Theresa formed an alliance with France, Russia, Saxony, and Sweden, and entered upon the Seven Years' War; but by the Peace of Hubertsberg, 1763, Silesia was recognized as Prussian territory. On the death of Francis I in 1765, Joseph II, his eldest son, was appointed to assist his mother in the government and elected emperor of Germany. The partition of Poland (1772) gave Galicia and Lodomeria to Austria, which also obtained Bukowina from the Porte in 1777. Area 264,202 sq. mi. Population 1901, Austria, 27,697,304; Hungary 19,203,531.

The liberal home administration of the empress was continued and extended by her successor, Joseph II, who did much to further the spread of religious tolerance, education, and the industrial arts. The Low Countries, however, revolted, and he was unsuccessful in the war of 1788 against the Porte. His death took place in 1790. He was succeeded by his eldest brother, Leopold II, under whom peace was restored in the Netherlands, and in Hungary, and also with the Porte. On the death of his sister and her husband, Louis XVI, of France, he formed an alliance with Prussia, but died in 1792, before the French Revolutionary War broke out.

His son, Francis II, succeeded, and was elected German emperor, by which time France had declared war against him as king of Hungary and Bohemia. In 1795, in the third division of Poland, West Galicia fell to Austria, and by the Peace of Campo-Formio (1797) she received the largest part of the Venetian territory as compensation for her loss of Lombardy and the Netherlands. In 1799 Francis, in alliance with Russia, renewed the war with France until 1801, when the Peace of Lunéville was concluded. In 1804 Francis declared himself hereditary emperor of Austria as Francis I, and united all his states under the name of the Empire of Austria, immediately taking up arms once more



DIVINES

Leo XIII
Henry Ward Beecher

Phillips Brooks
Charles H. Spurgeon

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Austria

with his allies, Russia and Great Britain, against France. The war of 1805 was terminated by the Peace of Pressburg (Dec. 26), by which Francis had to cede to France the remaining provinces of Italy, as well as to give up portions of territory to Bavaria, Württemberg, and Baden, receiving in return Salzburg and Berchtesgaden. After the formation of the Confederation of the Rhine (July 12, 1806) Francis was forced to resign his dignity as emperor of Germany, which had been in his family more than 500 years. A new war with France in 1809 cost the monarchy 42,380 sq. mi. of territory and 3,500,000 subjects. Napoleon married Maria Louisa, daughter of the emperor, and in 1812 concluded an alliance with him against Russia. But in 1813 Francis again declared war against France, and formed an alliance with Britain, Russia, Prussia, and Sweden against his son-in-law. By the Congress of Vienna (1815) Austria gained Lombardy and Venetia, and recovered, together with Dalmatia, the hereditary territories which it had been obliged to cede.

In the troubled period following the French Revolution of 1830 insurrections took place in Modena, Parma, and the Papal States (1831-32), but were suppressed without much difficulty; and though professedly neutral during the Polish insurrections Austria clearly showed herself on the side of Russia, with whom her relations became more intimate as those between Great Britain and France grew more cordial. The death of Francis I (1835) and accession of his son Ferdinand I made little change in the Austrian system of government, and much discontent was the consequence. In 1846 the failure of the Polish insurrection led to the incorporation of Cracow with Austria. In Italy the declarations of Pio Nono in favor of reform increased the difficulties of Austria, and in Hungary the opposition under Kossuth and others assumed the form of a great constitutional movement. In 1848, when the expulsion of Louis Philippe shook all Europe, Metternich found it impossible any longer to guide the helm of the state, and the government was compelled to admit a free press and the right of citizens to arms. Apart from the popular attitude in Italy and in Hungary, where the Diet declared itself permanent under the presidency of Kossuth, the insurrection made equal progress in Vienna itself, and the royal family, no longer in safety, removed to Innsbruck. After various ministerial changes the emperor abdicated in favor of his nephew, Francis Joseph; more vigorous measures were adopted, and Austria, aided by Russia, reduced Hungary to submission.

The year 1855 is memorable for the Concordat with the pope, which put the educational and ecclesiastical affairs of the empire entirely into the hands of the Papal See. In 1859 the hostile intentions of France and Sardinia against the possessions of Austria in Italy became so evident that she declared war by sending an army across the Ticino; but after disastrous defeats at Magenta and Solferino she was compelled to cede Milan and the n.w.

Automobile

portion of Lombardy to Sardinia. In 1864 she joined with the German states in the spoliation of Denmark, but a dispute about Schleswig-Holstein involved her in a war with her allies (1866), while at the same time Italy renewed her attempts for the recovery of Venice. The Italians were defeated at Custozza and driven back across the Mincio; but the Prussians, victorious at Königgrätz (or Sadowa), threatened Vienna. Peace was concluded with Prussia on August 23, and with Italy on October 3, the result of the war being the cession of Venetia through France to Italy and the withdrawal of Austria from all interference in the affairs of Germany.

Since 1866 Austria has been occupied chiefly with the internal affairs of the empire. Hungarian demands for self-government were finally agreed to, and the empire of Austria divided into the two parts already mentioned—the Cisleithan and the Transleithan. This settlement was consummated by the coronation of the Emperor Francis Joseph I, at Budapest, as king of Hungary, on the 8th of June, 1867. In the same year the Concordat of 1855 came up for discussion, and measures were passed for the re-establishment of civil marriage, the emancipation of schools from the domination of the church, and the placing of different creeds on a footing of equality. The fact of the Austro-Hungarian dominions comprising so many different nationalities has always given the central government much trouble, both in regard to internal and to external affairs. In regard to the "Eastern Question," for instance, the action of Austria has been hampered by the sympathies shown by the Magyars for their blood relations, the Turks, while the Slavs have naturally been more favorable to Russia. During the war between Russia and Turkey in 1877-78 Austria remained neutral; but at its close, in the middle of 1878, it was decided, at the Congress of Berlin, that the provinces of Bosnia and Herzegovina should in future be administered by Austria Hungary instead of Turkey. In February, 1888, a treaty between Austria and Germany was published, by which each agreed to assist the other in the case of an attack by Russia. In September, 1898, the Empress Elizabeth Amalie Eugenie was assassinated at Geneva, Switzerland, by an Italian anarchist, named Lucheni.

Automobile, the name which is popularly applied to all forms of self-propelling vehicles, used upon highways and streets for general freight and passenger service. Wagons, carriages, omnibuses, touring-cars, run-a-bouts, heavy vehicles for trucking freight and other road conveyances driven by steam, electricity, petroleum, gasoline or naphtha are classed as automobiles, provided they do not require tracks for their operation. The automobile proper is a development of comparatively recent date, though as early as 1680, Sir Isaac Newton invented a toy horseless carriage which embodied all the essential features of a steam automobile. In England and France several model steam carriages were constructed

Automobile

during the eighteenth century and in the United States Oliver Evans suggested the use of steam road-wagons to the Lancaster Turnpike Company of Maryland. But it was not until the nineteenth century that any important results in road machines were obtained. In 1827 Walter Hancock, an Englishman, patented what was then a remarkable boiler, and finally succeeded in applying it successfully to a three-wheeled vehicle which he called the *Automaton*. In this a vertical engine was placed near the middle of the vehicle and drove a chain-wheel with a chain-driver extending back to the rear axle. The *Automaton* ran regularly for twenty weeks as a coach between Stratford, Paddington and Islington, carrying over 12,000 passengers during this period. At about the same time that Hancock invented his boiler another Englishman, David Gurney, constructed and operated successfully a self-propelling carriage with a water-tube



Electric Motor Phaeton.

boiler and horizontal engine. This machine made a record of eighty-five miles in ten hours. Contemporary with Hancock and Gurney, several other inventors made valuable improvements on steam vehicles. But by 1836 all practical continued effort in the development of the horseless carriage had ceased and was never resumed to any extent until over fifty years later.

The period of modern development of the automobile began in 1894 when the Frenchman, M. Leon Serpollet applied his instantaneous generator or boiler, invented in 1889, to a motor vehicle. This boiler is of the water-tube type. The steel tubes are enclosed in a rectangular covering of two thicknesses of iron, with asbestos packed between them. The fuel used is vaporized oil. Just above and surrounding the burner is a coil of round pipe. This coil receives the water and passes it into the series

Automobile

of water-tubes, from which the steam and water pass into twisted flat tubes. These tubes deliver the steam immediately to the engine. In the modern Serpollet automobiles four-cylinder engines are used with the cylinders arranged in pairs. Most of the European motors are modeled after that of Serpollet.

Next to France, the chief development of the steam automobile has been in America. Some American machines have water-tubes, but many of these of standard make have fire-tubes of copper or steel, surrounding a cylindrical upright boiler. Gasoline is generally used as a fuel and is vaporized by special burners. Automatic feedpumps, operated from the engine usually supply water to the boiler.

Gasoline and electric automobiles came into use about the same time as the steam vehicles. The gasoline vehicles are very popular and are manufactured in many varieties. The motive power in these vehicles is given to the piston by the explosion of vaporized oil. By the successive explosions power is transmitted to a crankshaft, from which it is led off by a chain-drive or gearing to the driving shaft. Other oil vehicles, as petroleum and naphtha automobiles, are constructed on the same principle.

Of recent years, electric automobiles have come into extensive use in France and America. The electric vehicle makes use of electricity stored in the form of chemical energy in accumulators or storage batteries. It has besides the storage battery also a motor for transforming the current into mechanical power, and a controller for regulating the speed. In America the electric automobile is a great favorite. Not only electric pleasure carriages, but electric cabs, omnibuses and delivery wagons are extensively used. Among the advantages of the electric automobile are cleanliness, simplicity of construction, ease of control and the freedom from the noise, odor and vibration which attend other automobiles. Almost its only disadvantage is the weight of the battery, which retards the speed of the vehicle.

The manufacture of automobiles is an industry which since 1902 has rapidly increased in importance. In the United States the sales of automobiles in 1903 were double those of 1902, and amounted to 11,000 cars valued at \$12,000,000. Only 200 cars were imported, valued at \$800,000. Trade in foreign-made cars has, it is believed, passed its maximum, as American manufacturers are rapidly supplying the demand.

Interest in automobilism has been kept up by competitive speed trials. These trials, apart from the excitement of the race, are of the greatest benefit to the automobile designer, as they point the way to improvements in construction. Automobile racing has not become common in America, owing to the condition of

Autoplasty

the roads. The annual race for the Bennett trophy is an international affair. France, England and Germany have each held the trophy. An important contest held in 1903, was the Paris-Madrid race. Owing to the great number of serious accidents, the authorities were obliged to stop the race at Bordeaux. The winner was M. Gabriel, who covered the distance, 331.2 miles, in 5 hours, 13 minutes, 31 seconds.

Besides the more ordinary uses of automobiles for pleasure and commercial purposes, they have been used recently in America for plowing and thrashing and in France and Germany for army purposes. Racing launches, propelled by high-power gasoline automobile motors are coming into favor in France and the United States.

Autoplasty, the surgical operation for artificially repairing lesions by taking a piece of healthy tissue to supply the deficiency caused by deformity, disease or wounds. Harelip, injuries from scalds, burns or mutilations, or lesions caused by skin diseases, are treated in this way. Skin is the agent most frequently employed, and can be taken from the patient's body or that of some other person. Autoplasty was practiced in India centuries ago, but it was not until late in the nineteenth century that the transplanting of skin was successfully practiced.

Autumn, the season of the year, between summer and winter. Astronomically speaking, in the Northern Hemisphere this season covers the period from the autumnal equinox, about September 22, till the winter solstice, December 22. Popularly, however, in America the term autumn is used to denote the months of September, October and November; and in England, to denote August, September and October. In the Southern Hemisphere the seasons are reversed.

Autun (ô-tun), a town, southeastern France, department of Saône-et-Loire. It has two Roman gates of exquisite workmanship, the ruins of an amphitheater and of several temples, the cathedral of St. Lazare, a fine Gothic structure of the eleventh century; manufactures of carpets, woolens, cotton, velvet, hosiery, etc. Pop. 11,462.

Auvergne (ô-vâr-nyé), a province, central France, now merged into departments Cantal and Puy-de-Dôme; and an arrondissement of Haute-Loire. The Auvergne Mountains, separating the basins of the Allier, Cher, and Creuse from those of the Lot and Dordogne, contain the highest points of central France: Mount Dor, 6,188 ft.; Cantal, 6,093 ft., and Puy-de-Dôme, 4,806 ft. The number of extinct volcanoes and general geologic formation make the district one of great scientific interest. The minerals include iron, coal, copper, and lead, and there are warm and cold mineral springs. Auvergne contributes a large supply to the labor markets of Paris and Belgium, there being in Paris alone some 50,000 Auvergnats.

Av'anches, large masses of snow or ice precipitated from the mountains, and distinguished as *wind* or *dust avalanches*, when they

Average

consist of fresh-fallen snow whirled like a dust storm into the valleys; as *sliding avalanches*, when they consist of great masses of snow sliding down a slope by their own weight; and as *glacier* or *summer avalanches*, when ice-masses are detached by heat from the high glaciers. Avalanches have been divided into four classes: 1, Powdery avalanches, in which the snow and ice break up into powder, forming a kind of silver cloud, sparkling like quicksilver, and making a noise like distant thunder. This kind is more dangerous by reason of the commotion produced in the air than by its weight or power to overwhelm. 2, Creeping avalanches. The mass of snow being disengaged moves down a more gentle slope, as on an inclined plane, and so is sluggish in its course. 3, Glacier avalanche, consisting of a large mass of ice detached from the glacier above, which descends to the valley. This is the least dangerous kind, and is more common in summer. 4, The avalanche proper, which is the most dangerous of all, and consists of vast accumulations of snow set free from above, which increase in force as they descend, overthrowing houses, tearing up trees, burying villages, and swallowing up forests, cattle, and human beings. Avalanches are sometimes of immense size; two which fell in the Alpine districts of Italy, in 1885, contained 45,000 and 250,000 tons of snow respectively.

Av'alon, a sort of fairy land or elysium mentioned in connection with the legends of King Arthur, being his abode after disappearing from the haunts of men; called also Avilion. The name is also identified with Glastonbury, and has been given to a peninsula of Newfoundland.

Avellino (â-vel-le-nē), a town in Southern Italy, capital of the province of Avellino, 29 mi. e. of Naples, the seat of a bishop. Avellino nuts were celebrated under the Romans. Pop. 16,376. Area of the prov. 1,409 sq. mi.; pop. 419,688.

Av'e Mari'a ("Hail, Mary"), the first two words of the angel Gabriel's salutation (Luke 1:28), and the beginning of the very common Latin prayer to the Virgin in the Catholic Church. Its lay use was sanctioned at the end of the twelfth century, and a papal edict of 1326 ordains the repetition of the prayer thrice each morning, noon, and evening, the hour being indicated by sound of bells called the Ave Maria or Angelus Domini.

Av'erage, in maritime law, any charge or expense over and above the freight of goods, and payable by their owner. *General average* is the sum falling to be paid by the owners of ship, cargo, and freight, in proportion to their several interests, to make good any loss or expense intentionally incurred for the general safety of ship and cargo; e. g., throwing goods overboard, cutting away masts, port dues in cases of distress, etc. *Particular average* is the sum falling to be paid for unavoidable loss when the general safety is not in question, and therefore chargeable on the individual owner of the property lost. A policy

Avernus

of insurance generally covers both general and particular average, unless specially excepted.

Aver'nus, a lake, now called Lago d'Averno, in Campania, Italy, between the ancient Cumæ and Puteoli, about 8 mi. from Naples. It occupies the crater of an old volcano, and is in some places 180 feet deep. Formerly the gloom of its forest surroundings and its mephitic exhalations caused it to be regarded as the entrance to the infernal regions. It was the fabled abode of the Cimmerians, and especially dedicated to Proserpine.

Averroes (1120-1225 ?), a noted Arabian philosopher. Averroes regarded Aristotle as the greatest of all philosophers, and devoted himself so largely to the exposition of his works as to be called among the Arabians *the Interpreter*. He wrote a compendium of medicine, and treatises on theology, philosophy, jurisprudence, etc.

Aver'sa, a town of southern Italy, 7 mi. n. of Naples, in a beautiful vine and orange district, the seat of a bishop, with a cathedral and various religious institutions, and an excellently conducted lunatic asylum. Andreas of Hungary, husband of Queen Joanna I, was strangled in a convent here, Sept. 18, 1345. Pop. 21,510.

Aveyron (â-vâ-rôn), a department of France. The climate is cold, and agriculture is in a backward state, but considerable attention is paid to sheep-breeding. It is noted for its "Roquefort cheese." It has coal, iron, and copper mines, besides other minerals. Area 3,340 sq. mi.; capital, Rhodéz; pop. 415,826.

Av'lary, a building or enclosure for keeping, breeding, and rearing birds. Aviaries appear to have been used by the Persians, Greeks, and Romans, and are highly prized in China. In England they were in use at least as early as 1577, when William Harrison refers to "our costlie and curious aviaries." An aviary may be simply a kind of very large cage; but the term usually has a wider scope than this. The zoological collections in several American parks are noticeable for their fine aviaries.

Avicen'na (or Ebn-Sina) (980-1037), an Arabian philosopher and physician. At the age of twenty-one he wrote an encyclopedia of the sciences, but of his one hundred works the best known is the *Canon Medicinæ*, which was still in use as a text-book at Louvain and Montpellier in the middle of the seventeenth century.

Avigliano (â-vêl-yâ'nô), a town of Southern Italy, prov. Potenza. Pop. 13,057.

Avignon (â-vê-nyôn), an old town of s. e. France, capital of department Vaucluse. It is an archbishop's see, and has a large and ancient cathedral on a rock overlooking the town, the immense palace in which the popes resided (now barracks), and other old buildings. The silk manufacture and the rearing of silkworms are the principal employments in the district. Here Petrarch lived several years, and made the acquaintance of Laura, whose tomb is in the Franciscan church. From 1309 to 1376 seven popes in succession, from Clement V to Gregory XI, resided in

Ax

this city. After its purchase by Pope Clement VI in 1348 Avignon and its district continued, with a few interruptions, under the rule of a vice-legat of the pope, till 1791, when it was formally united to the French Republic. Pop. 41,007.

Avila (ä'vê-lâ), town of Spain, capital of province of Avila, a modern division of Old Castile. See of a bishop suffragan, with fine cathedral. Once one of the richest towns of Spain. Principal employment in the town, spinning; in the province, breeding sheep and cattle. Pop. town 9,199; province 187-211.

Avogad'ro's Law, in physics, asserts that equal volumes of different gases at the same pressure and temperature contain an equal number of molecules.

Avoirdupois (a-vêr'dy-pôis) (from old French, lit. "goods of weight"), a system of weights used for all goods except precious metals, gems, and medicines, and in which a pound contains 16 ounces, or 7,000 grains, while a pound troy contains 12 ounces, or 5,760 grains.

Av'ola, a seaport on the east of Sicily, with a trade in almonds, sugar, etc. Pop. 12,540.

A'von, the name of several smaller rivers in England of which the most famous rises in Leicestershire, flows past Shakespeare's birth-place, Stratford, and falls into the Severn.

Av'oset, a bird about the size of a lapwing. The bill is long, slender, elastic, and bent upward toward the tip, the legs long, the feet



The Common Avoset.

webbed, and the plumage variegated with black and white. The bird feeds on worms and other small animals which it scoops up from the mud of the marshes and fens that it frequents. It is found in Europe, Asia, Africa, and America; but the American species is slightly different from the other.

Ax, a well-known tool for cutting or chopping wood, consisting of an iron head with an arched cutting edge of steel, which is in line with the wooden handle of the tool, and not at right angles to it as in the adze.

The process of making axes is briefly as follows: The raw material is brought into the factory in great rough and rusty iron bars. It is put into the forges and heated until it is a

Axis

rich red. The workmen withdraw it by means of tackle and feed it between the rollers of a complicated machine, which cuts the bars into lengths double that of the ax, and shapes the metal in the general form of two axes placed butt to butt, and finally doubles the pieces together around a mold, thus leaving a loop in the middle for the helve-hole. The ax is then put into a furnace fired with gas, and raised to a white heat; thence it is carried to the base of a great tilt-hammer, which drops down upon it with terrific force, welding the folds together with a single blow. The ax is again taken to the furnace and heated red hot. It is then taken in hand by a workman who rasps its edges with a sharp saw to take off the jagged fringe of iron which still clings to it. Thus the iron part of the ax, that is, all of the butt and most of the blade, is complete. The steel for the knife-edge is heated at the furnace and then stamped into the desired shape by a die press. The two parts are now ready to be put together. A groove is cut into the forward edge of the iron butt and the steel knife-edge inserted. The whole ax is then heated and welded together with the great hammer. The blade of the ax has yet to be tempered, and this is the most important part of the work. The latest method of tempering is to dip the steel ax-blade into a pot of molten lead, and when sufficiently hot, to transfer it quickly into a vat of cold water. An experienced inspector then tests the blade to find out whether or not it is too brittle or not brittle enough. If it will not stand the test it is thrown aside, and the whole process must be gone over again. If the ax fulfills the requirements of the inspector it goes to the grinding-room, where it is smoothed, ground, and polished and put in shape for use.

Axis, the straight line, real or imaginary, passing through a body or magnitude, on which it revolves, or may be supposed to revolve; especially a straight line with regard to which the different parts of a magnitude, or several magnitudes, are symmetrically arranged; e.g. the *axis of the world*, the imaginary line drawn through its two poles.

In botany the word is also used, the stem being termed the *ascending axis*, the root the *descending axis*.

In anatomy the name is given to the second vertebra from the head, that on which the *atlas* moves.

Axle, a bar of iron or wood which supports a carriage or wagon and is supported on wheels, in the hubs of which its ends are inserted. Axles of railway cars do not revolve in the hubs of the wheels, but are keyed in them, and journals are turned on the portions outside the wheel. The manufacture of car axles is an interesting process. The enormous weight which falls upon a car or locomotive axle requires that they be made of the strongest iron obtainable. Axles under loaded freight cars for example must support a constant load of about ten tons, while the oscillation and vibration of the car, which sometimes throws the whole weight upon one side, requires that the

Axle

axle be exceedingly strong. Axles as usually manufactured are made of scrap iron and muck-bar iron. The scrap iron used in making axles consists of old bridge rods, old axles, and arch bars. These scraps before brought into the mill are cut into four-foot lengths by powerful shears. These four-foot pieces are put into a furnace with a slow fire where the rust and dirt are burned off, thus preventing any impurities in the welding. The pieces are assorted into piles of sufficient size to make an axle of given dimensions. The piles are then put into the heating furnace, three or four at a time, and heated to the welding point. A pair of huge tongs suspended from a crane by a heavy chain is swung around by a workman, and attached to the projecting end of one of the piles of iron, which by this time has been heated sufficiently to cause the different pieces to stick together. The mass is then swung around under the steam hammer. This hammer weighs about two tons. It is put in operation, and the hammer man takes hold of the end of the tongs, and after each blow of the hammer, changes the position of the iron so that no two blows will strike in exactly the same place. As soon as the iron becomes a little cool it is put back into the furnace and another piece is taken out and hammered in the same way. For the first hammering, when the slabs are being made, a flat hammer-block and hammer is used. After this a concave hammer face and hammer-block are substituted to give the correct shape of the axle. During the process of the hammering, the correct diameter is determined by means of a gauge. After both ends of the axle have been finished it is swung on to a skid made of two steel rails and allowed to cool. It is important that any pieces of steel be kept out of the axle in the welding. When the axle is thoroughly cooled it is lifted from the steel rails by means of tongs, and placed into a machine which cuts it off into the correct length. Then the axle is centered by having a small hole bored in exactly the center of each end, and is taken to the finishing room. The finishing process consists in putting the axle into a lathe and turning off some of the metal at each end so as to make a smooth surface for the bearings and wheel hub. The axle is now ready to have the wheels mounted on it. The wheels are pressed on to the axle by a powerful hydraulic press, and so accurate is the fit that it is said the union is stronger than if the wheel and axle had been heated and welded together.

Steel cannot be welded readily, and the method of making steel axles is somewhat different from that of making iron axles. Either Bessemer or open-hearth steel is used in steel axles. The steel is first melted and poured from the converters into ingots, which are then passed through rollers and brought down to pieces about six or seven inches square. The pieces are then heated in the furnace and pounded down to the correct form and diameter under the steam hammer in the same manner as an iron axle. Steel axles are not

Aye-aye

considered as good as iron on account of the danger of blow-holes forming in the interior of the axle. These blow-holes are made when the steel is being poured into the ingots and no amount of rolling or pounding will close them up, nor is there any way of telling when these holes occur inside of an axle until it breaks in service. The methods of working steel, however, are being greatly improved, and it will probably not be long until it will entirely replace iron for axles. Axles weigh from 350 to 425 pounds and at present are worth when made about \$8.50 each. Locomotive axles are much larger and heavier and weigh about 800 pounds each and have a diameter at the middle of seven or eight inches. Whenever an axle breaks it is usually in the journal near the wheel pit.

Aye-aye (i-i), an animal of Madagascar, so called from its cry, now referred to the lemur family. It is about the size of a hare, has large flat ears and a bushy tail, large eyes, long sprawling fingers, the third so slender as



Aye-Aye.

to appear shrivelled; color, musk-brown, mixed with black and gray ash. It feeds on grubs and fruits, and in its habits is nocturnal.

Ayesha (a-yesh'a) (610-678), daughter of Abu-Bekr and favorite wife of Mohammed, the Arabian prophet.

Ayr (är), a town of Scotland, capital of Ayrshire. William the Lion built a castle here in 1197 and constituted it a royal burgh in 1202; and the parliament which confirmed Robert Bruce's title to the crown sat in Ayr. One of its bridges, opened in 1879, occupies the place of the "New Brig" of Burns's *Brigs of Ayr*, the "Auld Brig" (built 1252) being still serviceable for foot traffic. Carpets and lace curtains are manufactured. The house in which Robert Burns was born stands within $1\frac{1}{2}$ miles of the town, between it and the church of Alloway ("Alloway's auld haunted kirk"), and a monument to him stands on a height between the kirk and the bridge over the Doon. Pop. 23,835. Ayrshire has an area of 1,149 sq. mi. The surface is irregular, and a large portion of it hilly, but much of it is fertile. Coal and iron are abundant; and there are numerous collieries and iron-works. Limestone and freestone abound. Agricul-

Azof

ture and dairy husbandry are extensively practised; the Ayrshire cows are celebrated as milkers. Woolen manufactures are extensive, particularly carpets, bonnets, and worsted shawls, produced in great quantities at Kilmarnock and other places. Pop. 226,283.

Aytoun, WILLIAM EDMONDSTOUNE (1813-1865), a Scotch poet and prose writer. In 1848 he published a collection of ballads entitled *Lays of the Scottish Cavaliers*, which has proved the most popular of all his works. In 1858 he edited a critical and annotated collection of the ballads of Scotland.

Aza'lea, a genus of plants, belonging to the heaths, remarkable for the beauty and fragrance of their flowers, and distinguished from



Flowering Branch of Azalea.

the rhododendrons chiefly by the flowers having five stamens instead of ten. Many beautiful rhododendrons with desiduous leaves are known under the name of *azalea* in gardens. Azaleas are common in North America. An Asiatic species is famous for the stupefying effect which its honey is said to have produced on Xenophon's army, is also common in gardens and shrubberies; and another is a brilliant greenhouse plant.

Azamgarh, a town of India, N. W. Provinces, capital of dist. of same name. Pop. 19,450. The district has an area of 2,550 sq. mi.; a pop. of 1,728,625.

Azerbaijan (ä-zer-bi-jän'), a province of Persia. Area 30,000 sq. mi.; pop. est. at 750,000. It consists generally of lofty mountain ranges, some of which rise to a height of between 12,000 and 13,000 ft. Agricultural products: wheat, barley, maize, fruit, cotton, tobacco, and grapes. Horses, cattle, sheep, and camels are reared in considerable numbers. Chief minerals: iron, lead, copper, salt, saltpeter, and marble. Tabreez is the capital. On the n. w. frontier is situated Mount Ararat.

Azof, Sea of, an arm of the Black Sea, with which it is united by the Straits of Kertch (or Kaffa); length about 170 mi., breadth about 80 mi.; greatest depth not more than 8 fathoms. The w. part, called the Putrid Sea, is separated from the main expanse by a long sandy belt called Arabat, along which runs a military road. The sea teems with fish. The Don and

Azores

other rivers enter it, and its waters are very fresh.

Azores (a-zōrz' or a-zō'res) (or Western Islands), a group belonging to and 900 mi. west of Portugal, in the North Atlantic Ocean. They are nine in number, and form three distinct groups—a n. w., consisting of Flores and Corvo; a central, consisting of Terceira, São Jorge, Pico, Fayal, and Graciosa; and a s. e., consisting of São Miguel (or St. Michael) and Santa Maria. The total area is about 900 sq. mi.; São Miguel (containing the capital, Ponta Delgada), Pico, and Terceira are the largest. The islands are volcanic and subject to earthquakes, and are conical, lofty, precipitous, and picturesque. The most remarkable summit is the peak of Pico, about 7,600 feet high. There are numerous hot springs. They are covered with luxuriant vegetation, and diversified with woods, corn-fields, vineyards, lemon and orange groves, and rich open pastures. The mild and somewhat humid climate, combined with the natural fertility of the soil, brings all kinds of vegetable products rapidly to perfection. The climate is recommended as suitable for consumptive patients. The Azores were discovered by Cabral about 1431, shortly after which date they were taken possession of and colonized by the Portuguese. When first visited they were uninhabited, and had scarcely any other animals except birds, particularly hawks, to which, called in Portuguese *açores*, the islands owe their name. Pop. 270,000.

Az'tecs, a race of people who settled in

Azurite

Mexico early in the fourteenth century, ultimately extended their dominion over a large territory, and were still extending their supremacy at the time of the arrival of the Spaniards, by whom they were speedily subjugated. Their most celebrated ruler was Montezuma, who was reigning when the Spaniards arrived, about the middle of the fifteenth century. Although ignorant of the horse, ox, etc., they had a considerable knowledge of agriculture, maize and the agave being the chief produce. In metal work, feather work, weaving and pottery they possessed a high degree of skill. To record events they used hieroglyphics; and their lunar calendars were of unusual accuracy. Two special deities claimed their reverence: Hintzilopochtli, the god of war, propitiated with human sacrifices; and Quetzalcoatl, the beneficent god of light and air, with whom at first the Aztecs were disposed to identify Cortez. Their temples, with large terraced pyramidal bases, were in the charge of an exceedingly large priesthood, with whom lay the education of the young. As a civilization of apparently independent origin, yet closely resembling in many features the archaic Oriental civilizations, the Aztec civilization is of the first interest. See *Mexico*.

Azurite, a crystallized copper carbonate, usually found in copper ores. Some varieties are cut into slabs and used for table tops, and others, especially those found in the mines of Arizona, are highly esteemed as gems. It is azure blue in color. See colored plate, *Gems*.

B

Baal

B is the second letter and the first consonant in the English and most other alphabets. It is a mute and labial, pronounced solely by the lips, and is distinguished from *p* by being sonant, that is, produced by the utterance of voice as distinguished from breath.

In music **B** is the seventh note of the model diatonic scale, or scale of C. It is called the leading note, as there is always a feeling of suspense when it is sounded until the key-note is heard.

Ba'al (Bel), a Hebrew and general Semitic word signifying simply lord, and applied to many different divinities. In Hosea 2:16 it is applied to Jehovah himself, while *Baal-berith* (the Covenant-lord) was the god of the Shechemites, and *Baal-zebub* (the Fly-god) the idol of the Philistines at Ekron.

Baalbek', a place in Syria, at the foot of Antilibanus, 40 mi. from Damascus, famous for its magnificent ruins. Of these the chief is the temple of the Sun, built either by Antoninus Pius or by Septimius Severus. Some of the blocks used in its construction are 60 ft. long by 12 ft. thick. Near it is a temple of Jupiter, of smaller size though still larger than the Parthenon at Athens. It became a Roman colony under Julius Caesar, was garrisoned by Augustus, and acquired renown under Trajan as the seat of an oracle. It was sacked by the Arabs in 748, and more completely pillaged by Tamerlane in 1401; it sank into decay. The destruction was completed by an earthquake in 1759.

Bab'bage, CHARLES (1792-1871), an eminent English mathematician and inventor of the calculating machine. As early as 1812 he conceived the idea of calculating numerical tables by machinery, and in 1823 he received a grant from government for the construction of such a machine. After a series of experiments Babbage abandoned the undertaking in favor of an analytical engine, worked with cards like the Jacquard loom; but the project was never completed. The incompleted machine is now in the South Kensington Museum.

Babbit-metal, a soft metal resulting from alloying together certain proportions of copper, tin, and zinc or antimony, used with the view of as far as possible obviating friction in the bearings of journals, cranks, axles, etc., invented by Isaac Babbit (1799-1862), a goldsmith of Taunton, Mass.

Babcock, ORVILLE E. (1835-1884); b. in Franklin, Vt. He graduated at West Point, served during the whole of the Civil War, and served as aide-de-camp to General Grant. Colonel Babcock acted as Grant's secretary 1869-71, when he was appointed superintendent of buildings in the District of Columbia. In 1876 he was indicted for complicity in the whisky-ringing frauds, but was acquitted.

Baboon

Babel, Tower of, a structure in the plain of Shinar, Mesopotamia, commenced by the descendants of Noah subsequent to the deluge. It has commonly been identified with the great temple of Belus (or Bel) that was one of the chief edifices in Babylon, and the huge mound called Birs Nimrud is generally regarded as its site, though another mound, which to this day bears the name of Babil, has been assigned by some as its site. Babel means literally "gate of God."

Bab-el-Mandeb ("gate of tears," from being dangerous to small craft), a strait, 15 mi. wide, between the Indian Ocean and the Red Sea, formed by projecting points of Arabia in Asia, and Abyssinia in Africa. The island of Perim is here.

Ba'ber (1483-1530), first grand Mogul, the founder of the Mogul dynasty in Hindustan. He was sovereign of Cabul. He several times invaded Hindustan, and in 1525 killed Sultan Ibrahim, the last Hindu emperor of the Afghan race. He made many improvements, social and political, in his empire, and left a valuable autobiography.

Ba'boon, a common name applied to a division of old-world apes and monkeys. They have



Sacred Baboon.

elongated, abrupt muzzles like a dog, strong tusks or canine teeth, usually short tails, cheek-pouches, small, deep eyes with large eyebrows and naked callosities on the buttocks. Their hind and fore feet are well proportioned, so that they run easily on all fours, but they do not maintain themselves in an upright posture with facility. They are generally of the size of a moderately large dog, but the largest, the mandrill, is, when erect, nearly of the height of a man. They are almost all African, ugly, sullen, fierce, and gregarious, defending themselves by throwing stones, dirt, etc. They live

Babrius

on fruits and roots, eggs and insects. They include the chacma, drill, common baboon, and mandrill. The chacma or pig-tailed baboon is found in considerable numbers in parts of the South African colonies, where the inhabitants wage war against them on account of the ravages they commit in the fields and gardens. The common baboon inhabits a large part of Africa farther to the north. It is of a brownish-yellow color, while the chacma is grayish black, or in parts black. The hamadryas of Abyssinia is characterized by long hair, forming a sort of shoulder cape. The black baboon is found in Celebes.

Bab'rius, a Greek poet who flourished during the second or third century of the Christian era, and wrote a number of Æsopian fables. Several versions of these made during the Middle Ages have come down to us as Æsop's fables. In 1840 a manuscript containing 120 fables by Babrius, previously unknown, was discovered on Mount Athos.

Bab'ylon, the capital of Babylonia, once one of the largest and most splendid cities of the ancient world, now a scene of ruins. It was a royal city sixteen hundred years before the Christian era; but the old city was almost entirely destroyed in 683 B. C. A new city was built by Nebuchadnezzar nearly a century later. This was in the form of a square, each side 15 mi. long, with walls of such immense height and thickness as to constitute one of the wonders of the world. It contained splendid edifices, large gardens, and pleasure grounds, especially the "hanging gardens," a sort of lofty, terraced structure supporting earth enough for trees to grow, and the celebrated tower of Babel, or temple of Belus, rising by stages to the height of 625 ft. After the city was taken by Cyrus in 538 B. C., and Babylonia made a Persian province, it began to decline, and had suffered severely by the time of Alexander the Great. Interesting discoveries have been made on its site, especially of numerous and valuable inscriptions in the cuneiform or arrowhead character. The modern town of Hillah is believed to represent the ancient city, and the plain here for miles round is studded with vast mounds of earth, and brick, and imposing ruins. The greatest mound is Birs Nimrud, about 6 mi. from Hillah. It rises nearly 200 ft., is crowned by a ruined tower, and is commonly believed to be the remains of the ancient temple of Belus. Another great ruin-mound, called Mujellibeh, has also been assigned as its site.



Cuneiform Inscriptions.

Babylonia (now Irak Arabi), an old Asiatic empire occupying the region watered by the lower course of the Euphrates and the Tigris, and by their combined stream. The inhabitants, though usually designated Babylonians, were sometimes called Chaldeans. At the

Babylonia

earliest period of which we have record, the whole valley of the Tigris and Euphrates was inhabited by tribes of Turanian or Tatar origin. Along with these, however, there early existed an intrusive, Semitic element, which gradually increased in number till at the time the Babylonians and Assyrians (the latter being a kindred people) became known to the Western historians, they were essentially Semitic peoples. The great city Babylon (or Babel) was the capital of Babylonia, which was called by the Hebrews Shinar. The country was, as it still is, exceedingly fertile, and must have anciently supported a dense population. The chief cities, besides Baby-



Chaldean Cylinder, — Marble or Porphyry.

lon, were Ur, Calneh, Erech, and Sippara. Babylonia and Assyria were often spoken of together as Assyria.

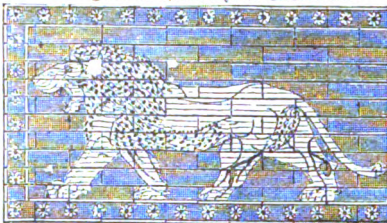
The discovery and interpretation of the cuneiform inscriptions have enabled the history of Babylonia to be carried back to about 4000 B. C., at which period the inhabitants had attained a considerable degree of civilization, and the country was ruled by a number of kings or princes, each in his own city. About 2700 B. C. Babylonia came under the rule of a single monarch. Latterly it had serious wars, and for several hundred years previous to 2000 B. C. Babylonia was subject to the neighboring Elam. It then regained its independence, and for a thousand years it was the foremost state of Western Asia in power, as well as in science, art, and civilization. The rise of the Assyrian Empire brought about the decline of Babylonia, which latterly was under Assyrian domination, though with intervals of independence. Tiglath-Pileser II, of Assyria (745-727), made himself master of Babylonia; but the conquest of the country had to be repeated by his successor, Sargon, who expelled the Babylonian king, Merodach-Baladan, and all but finally subdued the country, the complete subjugation being effected by Sennacherib. After some sixty years the second or later Babylonian Empire arose under Nabopolassar, who, joining the Medes against the Assyrians, freed Babylon from the superiority of the latter power, 625 B. C. The new Empire was at its height of power and glory under Nabopolassar's son, Nebuchadnezzar (604-561), who subjected Jerusalem, Tyre, Phœnicia, and even Egypt, and carried his dominion to the shores of the Mediterranean and northward to the Armenian mountains. The capital,



1. Personal Appearance of the Ruler of Chorsabad.



2. Figure at Entrance of Chorsabad.



3. Wall Paintings of Niniveh.



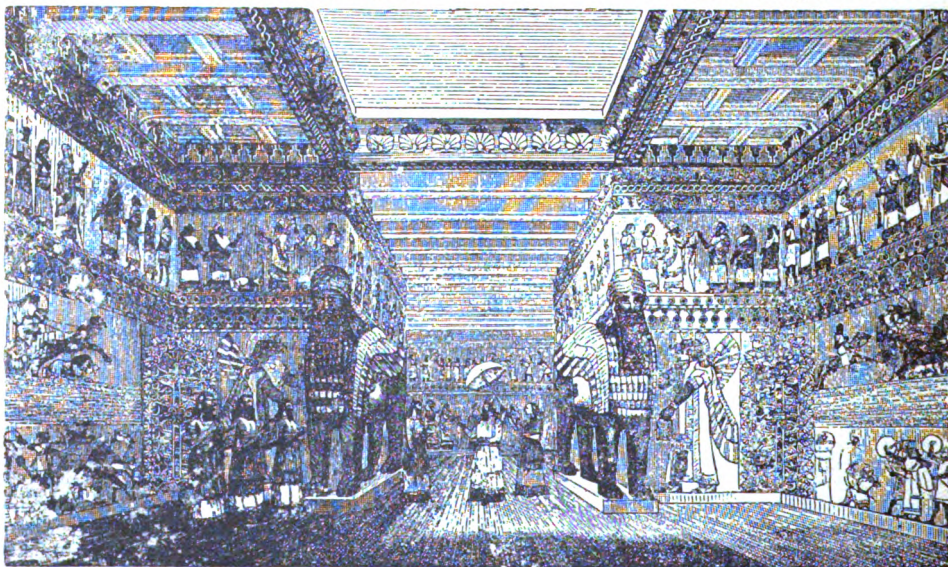
4. Personal Form of Ruler from Chorsabad.



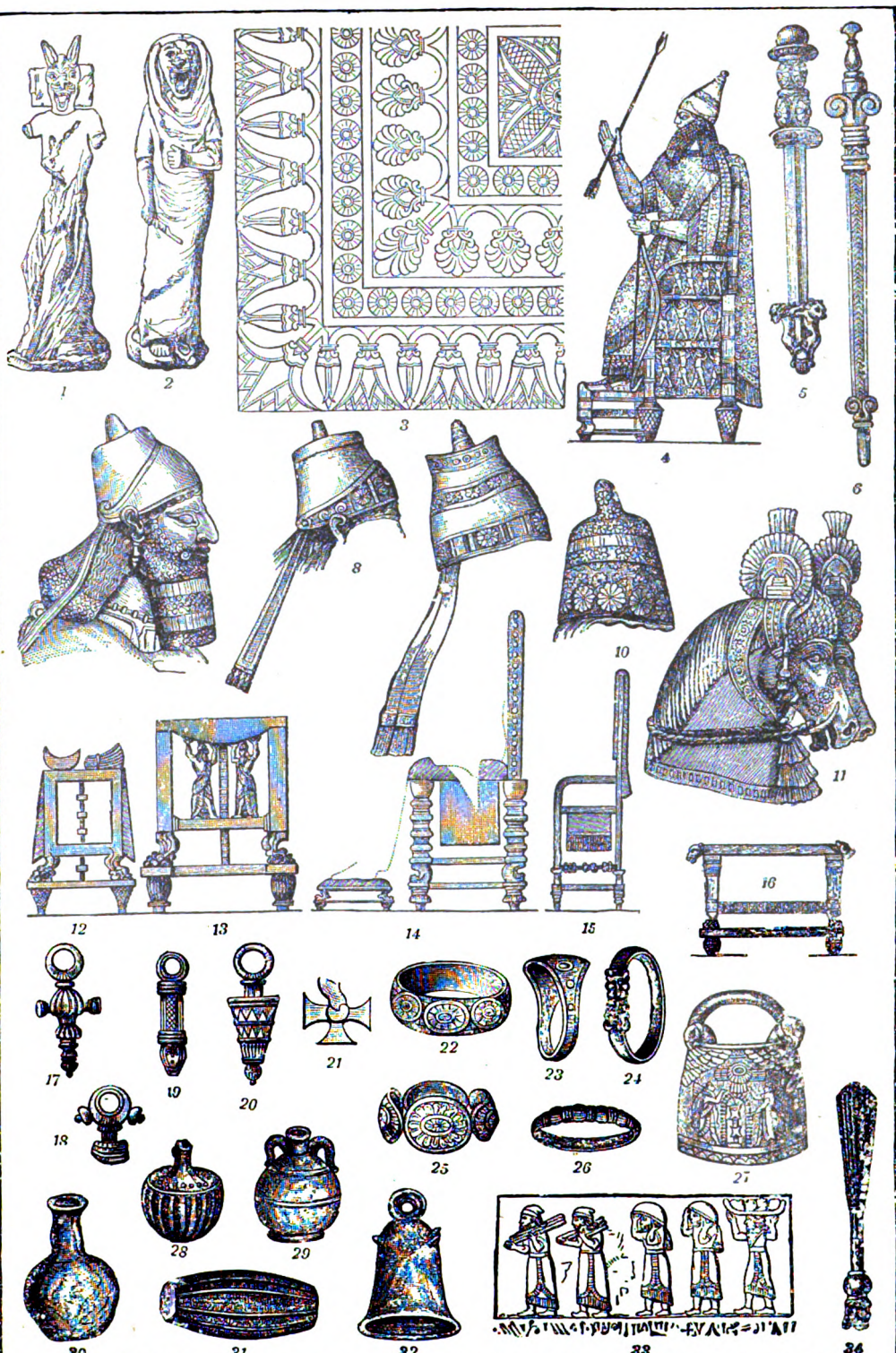
5. Relief from Chorsabad.



6. Wall Painting of Niniveh.



7. Festive Hall in Chorsabad (attempted restoration).



1, 2. Form of Idols from Chorsabad. 3. Floor Pavement at Kujundsichik. 4. King on his Throne. 5, 6. Ornamental Weapons. 7. Head of a King. 8-10. Royal Headwear. 11. Headrigs of Horses. 12-16. Furniture. 17-21. Earrings. 22-26. Jewelry. 27. Sacred Vessel. 28-30. Vessels. 31. Cylinder Cuneiform Inscription. 32. Bell. 33. Representations of an Obelisk at Nimrod. 34. Fan or Brush.

Babylonish Captivity

Babylon, was rebuilt by him. He was succeeded by his son, Evil-Merodach, but the dynasty soon came to an end, the last king being Nabonetus (or Nabonadius), who came to the throne in B. C. 555, and made his son, Belshazzar, co-ruler with him. Babylon was taken by Cyrus the Persian monarch in 538, and the second Babylonian Empire came to an end, Babylonia being incorporated in the Persian Empire. The account of the civilization, arts, and social advancement of the Assyrians already given in the article *Assyria* may be taken as generally applying also to the Babylonians, though certain differences existed between the two peoples. In Babylonia stone was not to be had, and consequently brick was the almost universal building material. Sculpture was thus less developed in Babylonia than in Assyria, and painting more. Babylonian art had also more of a religious character than that of Assyria, and the chief edifices found in ruins are temples. Weaving and pottery were carried to high perfection. Astronomy was cultivated from the earliest times. The Babylonians had a number of deities, but latterly the chief or national deity was Bel Merodach,



King Merodach-Idin-akhl.

originally the sun-god. Education was well attended to, and there were schools and libraries in connection with the temples.

Babylonish Captivity. See *Hebrews*.

Bacchus (bak'us) (in Greek, generally Dionysos), the god of wine, son of Zeus (Jupiter) and Sémélē. He first taught the cultivation of the vine and the preparation of wine. In art he is represented with the round, soft, and graceful form of a maiden rather than with that of a young man. He is usually naked; sometimes he has an ample mantle hung negligently round his shoulders; sometimes a fawn-skin hangs across his breast. He is often accompanied by Silenus, Bacchantes, Satyrs, etc. The Bacchanalia were feasts periodically held in his honor, and characterized by licentiousness, on which account the Roman Senate abolished them in B. C. 187. A Bacchante was the name given generally to a female taking part in such feasts and processions.

Backgammon

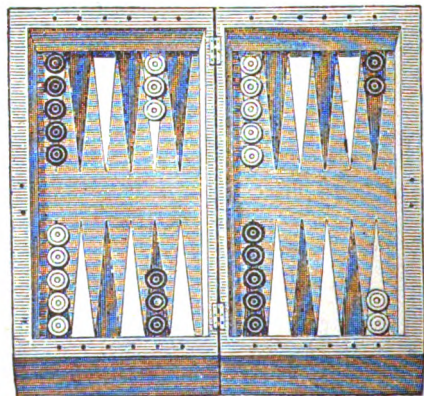
Baccio Della Porta (bách'ō) (1469-1517), Italian painter, better known under the name of Fra Bartolommeo. He studied painting in Florence, was an admirer and follower of Savonarola, on whose death he took the Dominican habit, and assumed the name of Fra Bartolommeo. He was the friend of Michael Angelo and Raphael; painted many religious pictures, among them a *Saint Mark* and *Saint Sebastian*, which are greatly admired.

Bach (báh), JOHANN SEBASTIAN (1685-1750), one of the greatest of German musicians. Being the son of a musician he was early trained in the art, and soon distinguished himself. In 1703 he was engaged as a player at the court of Weimar, and subsequently he was musical director to the Duke of Anhalt-Köthen, and latterly held an appointment at Leipsic. He paid a visit to Potsdam on the invitation of Frederick the Great. As a player on the harpsichord and organ he had no equal among his contemporaries; but it was not till a century after his death that his greatness as a composer was fully recognized. His compositions are largely of the religious kind. They include pieces, vocal and instrumental, for the organ, piano, stringed and keyed instruments; church cantatas, oratorios, masses, passion music, etc. More than fifty musical performers have proceeded from this family. Bach had eleven sons, all distinguished as musicians.

Bachelor's Buttons, the double-flowering buttercup with white or yellow blossoms, common in gardens.

Bacil'lus, the name applied to certain minute, rod-like, microscopic organisms (bacteria) which often appear in putrefactions, and one of which is believed to hold a constant causative relation to tubercles in the lung, and to be present in all cases of consumption. It is one of the three principal classes of bacteria. See *Bacteria*.

Backgam'mon, a game played by two persons upon a table or board made for the purpose, with pieces or men, dice-boxes, and dice. The table is in two parts, on which are twenty-four black and white spaces called points. Each player has fifteen men of different colors for the purpose of distinction. The move-



Bacon

ments of the men are made in accordance with the numbers turned up by the dice. It is said to have been invented in the tenth century.

Bacon, DELIA (1811-1859), born in Ohio. She was a talented woman, who sought to prove that Francis Bacon was the author of the Shakespearean plays.

Bacon, FRANCIS, Lord Verulam, Viscount St. Albans (1561-1626), known generally by Pope's characterization as "the wisest, brightest, meanest of mankind." Queen Elizabeth playfully styled him her "young Lord Keeper." He studied at Trinity College, Cambridge, where, it is said, he acquired his hatred of Aristotelianism, and began to sketch his own scheme of philosophy. Leaving college, he went to Paris. There he occupied himself with diplomacy and scientific investigation until 1580, when the death of his father recalled him to England. His bright talents excited the alarm of his uncle, Lord Burleigh, then Premier, who saw in him a most formidable rival to his own son Robert. Although B. then paid court to Burleigh's rival, Essex, the latter was not powerful enough to prevent him from being defeated in his contest in 1594 for the attorney-generalship. To make up for this defeat, Essex presented B. with an estate at Twickenham worth \$10,000 a year. Yet B. is found as the chief persecutor of Essex, both by pen and tongue, for conspiracy against the queen, and although various attempts have been made to explain this away, it is impossible to acquit him of ingratitude. B., who had entered Parliament as member for Middlesex in 1595, rose rapidly in the reign of James I. He was knighted in 1603, became attorney-general in 1613, in which office he also shows himself in an unfavorable light, as countenancing the torture of an old clergyman of the name of Peacham by the rack; Keeper of the Great Seal in 1617, and in 1619, Lord Chancellor, with the title of Lord Verulam. Next year he was made Viscount St. Albans. It seems undoubted that B. abused the high position he had now attained, by taking advantage of his judicial functions to increase his revenues. The scandal became so great, that neither the king nor his favorite Villiers, to whom he had truckled in the most abject manner, could shield him from popular indignation; a parliamentary inquiry was instituted in 1621; B. confessed to twenty-three acts of corruption, and was sentenced to a fine of \$200,000, to be confined in the Tower during the king's pleasure, and to be banished for life from the court, and from public employment. Although the fine was remitted, and the imprisonment only lasted two days, B. never returned to public life, but on a pension of \$6,000 a year devoted himself to literature and science. His death took place in 1626, the common story being that he caught a chill while endeavoring to test the power of snow to preserve flesh. His debts amounted to \$110,000.

His intimacy with every department of human knowledge except mathematics is mar-

Bacteria

velous; while few writers have been more eloquent, more imaginative, or more witty. He will be best remembered as, "if not absolutely the father of the Inductive Philosophy, in the sense of the inventor of the method of interrogating nature by experiment and observation, the popularizer of that philosophy." Of late years an attempt has been made to ascribe to Bacon the authorship of the Shakespearean plays. Ingenious as some of the arguments have been, the balance of probability remains against such a theory. Pl. 9, Vol. I.

Bacon, LEONARD (1802-1881), b. in Detroit, Mich. He graduated at Yale in 1820, and in 1825 was ordained pastor of the First Congregational church of New Haven, which pastorate he held until his death. He was professor of didactic theology in Yale, 1866-1871. Dr. Bacon edited *The Christian Spectator*, wrote for the *New Englander*, and founded and edited the *Independent* (1847).

Bacon, LEONARD WOOLSEY, b. 1830, in New Haven, Conn., son of the foregoing. He graduated at Yale in 1850, and studied theology at Andover and medicine at Yale. He served as pastor of churches in New York and Connecticut, and has written much for the religious press.

Bacon, ROGER (1214-1294), an English monk, and one of the most profound and original thinkers of his day. He first entered the University of Oxford, and went afterward to that of Paris, where he received the degree of Doctor of Theology. About 1250 he returned to England, entered the order of Franciscans, but having incurred the suspicion of his ecclesiastical superiors on a charge of practising "black art" or magic, he was sent to Paris and kept in confinement for ten years. Having been set at liberty, in 1278 he was again thrown into prison, where he remained for at least ten years. His most important work is his *Opus Majus*, where he discusses the relation of philosophy to religion, and then treats of language, metaphysics, optics, and experimental science. He was intimately acquainted with geography and astronomy.

Bacteria (Gr., Bakterion, a little staff), are minute unicellular vegetable organisms which multiply by transverse division. They are spherical, oval, rod-like, or spiral in shape and are devoid of chlorophyll, owing to the absence of which they are forced to lead a *saprophytic* life (obtaining nutrition from dead organic matter); or a *parasitic* life (obtaining nutriment from living matter). The rôle played in nature by the saprophytic bacteria is a very important one. Through their presence the highly complicated tissues of dead animal and vegetable matter are resolved into the simple compounds (carbonic acid, water, and ammonia) in which form they may be taken up and appropriated as nutrition by the more highly organized members of the vegetable kingdom. It is through this ultimate production of carbonic acid, water, and ammonia, as end-products in the process of decomposition and fermentation of the dead animal and vegetable tissues, that the demands of

Bacteria

growing vegetation for these compounds are supplied. Saprophytes must be looked upon in the light of "benefactors," without which existence would be impossible. With the parasites, on the other hand, the conditions are far from analogous. Through their activities there is constantly a loss to both the animal and vegetable kingdom. Their host must be a living body in which exist conditions favorable to their development and from which they appropriate substances necessary to the health of the organism to which they have found access; at the same time they eliminate substances as products of their nutrition that are directly poisonous to the tissues in which they are growing. For the growth of bacteria, organic matter of a neutral or slightly alkaline reaction, in the presence of moisture and a suitable temperature (41.9° F.-118.4° F.) is necessary. Some bacteria flourish in an atmosphere of oxygen, while to others the presence of this gas is a detriment, hence bacteria are divided into anaerobic (not living in oxygen) and aerobic (living in oxygen).

The principal forms of bacteria are:—

1. *Micrococci*.
2. *Bacilli*.
3. *Spirilla*.

The *micrococci* are small oval or round bodies which grow and multiply in various ways so that by their development we have formed the *staphylococci* (cocci in bunches), the *streptococci* (cocci in chains), *diplococci* (cocci in pairs), *tetrads* (cocci in fours), *sarsinae* (cocci in squares, cubes, etc.). The most common of these micrococci are the pus microbes *staphylococcus*, golden, lemon-colored, and white, and the *streptococcus*. The bacilli are minute rod-shaped organisms, and varied as to length, breadth, and thickness. The *bacillus tuberculosis*, the *bacillus typhosis*, and the *bacillus anthracis* are common examples of this form of microbe.

The *spirilla* are minute spiral or comma-shaped germs which sometimes present letter S curves and sometimes appear as though they were bacilli. Examples of this form are *Spirillum Asiaticæ Cholerae* and *spirillum of Finkler-Prior*.

An important feature of certain bacteria is their power of spore formation, a process by which an organism is enabled to enter a state in which it resists influences deleterious to its growth. It is this property which renders certain germs so harmful, as in this state they resist chemical and physical agents that easily destroy life, even resisting the action of a temperature of 212° F. for several hours. The *bacillus anthracis* is a noticeable example of this. Certain bacteria possess the property of motility. The propelling power are hair-like appendages, called flagellæ, projecting from various parts of the body-wall. This motility is an important point in bacteriologic diagnosis, and is possessed pre-eminently by the *bacillus typhosis*.

Bacteria are found everywhere (in air, soil, water, clothing, surface of bodies, mucous membrane, etc.), and they multiply so rapidly

Bacteria

that, it has been estimated, one bacillus in 24 hours will produce 16½ millions.

By their growth bacteria produce certain poisons, called *ptomaines* (saprophytic) and *toxalbumins* (parasitic). This action producing ptomaines is the cause of the numerous deaths reported from eating ice cream, sausage, and other substances. As an example of the poisonous effect of the toxalbumins we have the *bacillus diphtheria*, which acts by its toxine in producing the condition known as "intoxication."

For the artificial cultivation of bacteria in the laboratory certain media are used. As to the method of their preparation nothing need now be said, suffice it to say that the general media are gelatin, agar-agar, bouillon, glucose-agar, litmus milk, potato, blood-serum. Special media are used in certain cases as some germs grow feebly or not at all on one general culture ground. An example of a special medium is human blood-serum in the artificial cultivation of the *gonococcus*.

After the preparation of the media, it must be made perfectly sterile. This is accomplished by submitting it to the action of live steam for half an hour on three successive days. The object of this "fractional sterilization" is to kill the successive crops of spores as they develop, as a single steaming will not accomplish this purpose.

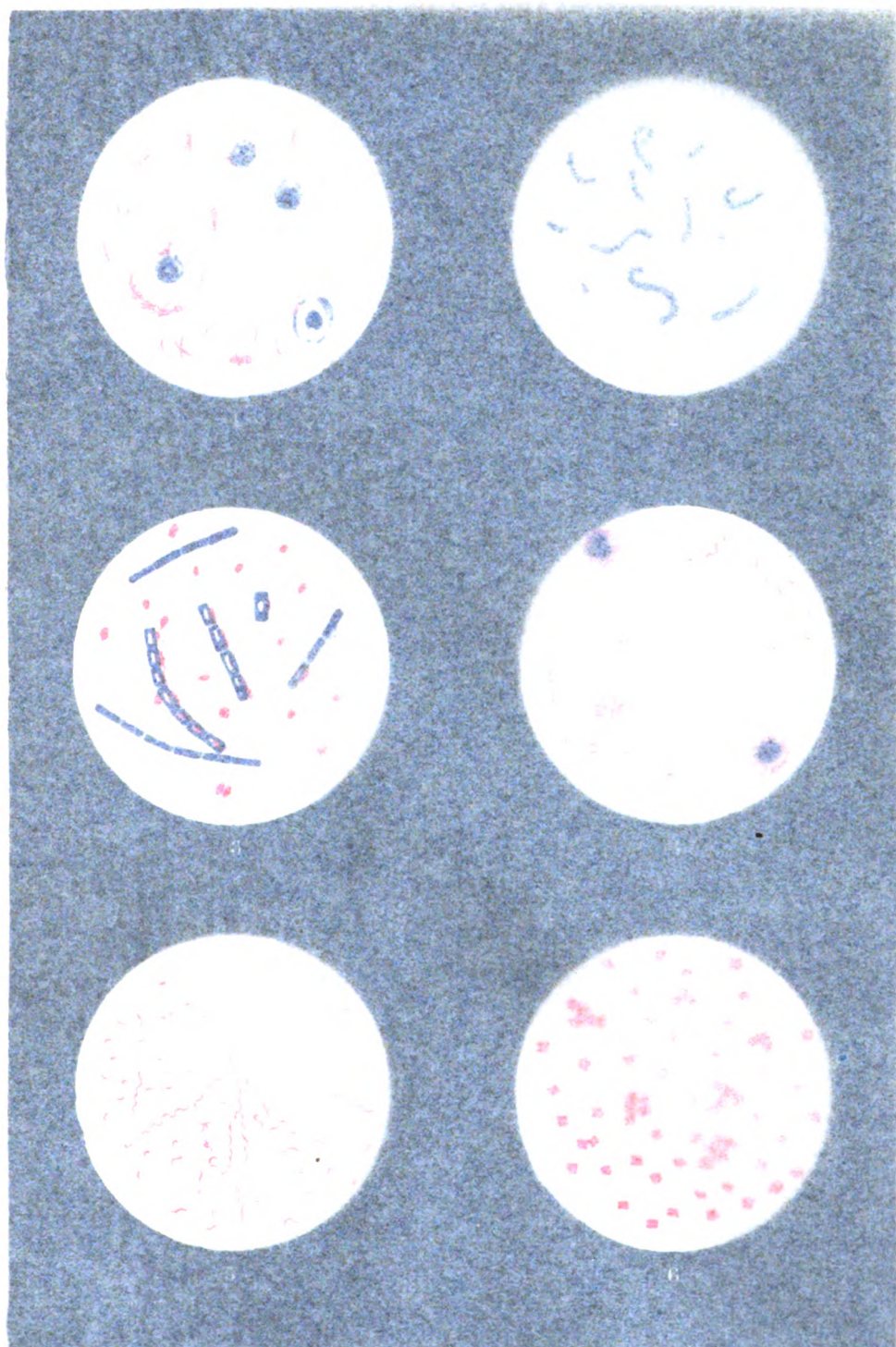
Having rendered our media sterile, we are in a condition to study bacteria systematically and thoroughly.

This in brief is as follows:—

1. At the post-mortem or during life a specimen is obtained from the selected site (scraping from mucous membrane in diphtheretic throat). This specimen is inoculated on a tube containing sterile agar-agar. This tube is then placed in an incubator and kept at a temperature of 97° F. for about 24 hours, at the end of which time an extensive growth of bacteria (if any be present) will be noticed.

2. Our next step will be to isolate in pure culture the various germs which have grown out upon the agar-agar tube in No. 1. This pure culture is obtained by inoculating from the original agar-agar tube, a tube of nutrient bouillon. From this bouillon tube we now inoculate with 2 drops of the nutrient bouillon, 2 sterile agar-agar tubes, the one from the other. This agar-agar should be melted and cooled down to a temperature of 113° F. prior to inoculation with the nutrient bouillon culture. After the agar-agar has been inoculated, it is poured out into flat Petri dishes, in order to enlarge the surface and separate the colonies which will subsequently develop. These Petri dishes are then placed in the incubator at a temperature of 97° F. (if we use agar-agar as plate media), of 68° F. (if we use plain gelatin) and kept for 24 hours. At the end of this time we notice separate colonies developed on the surface or in the substance of the culture medium.

3. The next step in the examination is the inoculation, on to a new sterile agar-agar tube, of a specimen from each of the varying colo-



BACTERIA.

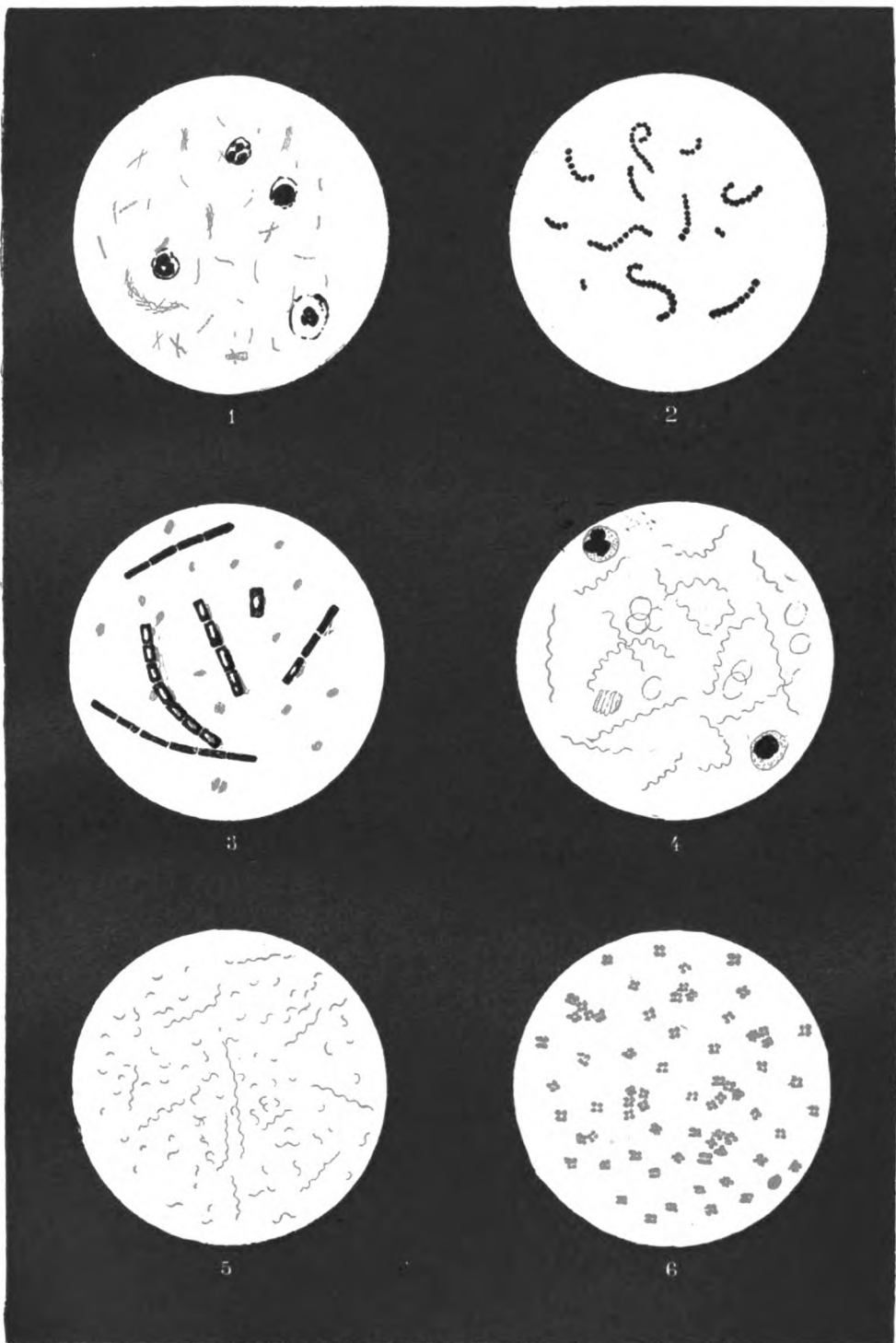
1. Tubercle Bacillus (Bacillus Tuberculosis, Koch). 2. Streptococcus (Streptococcus Obermeieri in blood in typhoid fever). 3. Corynebacterium (Corynebacterium).

4. Bacillus Anthracis, with capsules. 5. Micrococcus.

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BACTERIA.

1. Tubercle Bacillus (*Bacillus Tuberculosis*, Koch). 2. *Streptococcus Pyogenes*. 3. *Bacillus Anthracis*, with Spores. 4. *Spirillum Obermeiri* in blood of relapsing fever. 5. Comma Bacillus of Asiatic Cholera. 6. *Micrococcus Tetragenus* (Saprophytic).

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nies developed on the agar-agar plate. This is then incubated, and we have as the result a pure culture of each separate organism obtained from the original inoculation.

4. The next step consists in cultivating the germ artificially upon the various laboratory media. This is done by inoculating with a specimen from our pure culture each of the media in turn, and subjecting them to incubation for 24 hours.

5. Having examined the cultural peculiarities of the microbe, we examine the germ itself in microscopic section. For this purpose we use both stained preparations and the unstained hanging drop. The common laboratory staining agents are the aniline coloring agents such as carbol fuchsin, methylene blue, gentian violet, etc.

6. Our final step in the identification of a bacterium is the inoculation of an animal with a pure culture of the germ under observation. The casual development must be noted with regularity and precision; symptoms must be studied carefully, and if we succeed in producing the disease, with which we know or suspect the original person or animal to have died, we have positive evidence that we have isolated, cultivated, and inoculated the germ causing the original disease.

These are the successive steps in the study of a microbe, and by this method Koch, its promulgator, succeeded in proving that the *Bacillus Tuberculosis* was the specific causal agent in the disease tuberculosis. Numerous infective diseases exist, for which the special causal agent has, as yet, not been discovered; but just as soon as we can start with a disease and by successive steps proceed to the production of the same disease in a susceptible animal, then can we say that the specific causal agent for that disease has been discovered.

These are the general principles underlying the study of bacteria as a whole, but certain specific cases must be considered in which the technique, although it may be carried out in this way, is generally altered to suit the conditions. The consideration of specific bacteriology will be based on the work done in the Laboratory of the Department of Health of Chicago. In this laboratory examinations are made of water (as regards its typhoid tendencies), of suspected diphtheretic cases, of cases of supposed tuberculosis, of cases suspected to be cholera in times of epidemic, and of many other cases coming under the notice of this department in its effort to insure the best general health possible.

In examination cases of supposed tuberculosis of lungs (consumption), a specimen of sputum is obtained from the patient to be examined. One of the white cheesy masses found in it is selected for the future examination. A portion of this mass is placed upon a clean cover glass (a very thin glass section), and is spread out over the surface of this glass in as fine a film as possible. This film is allowed to dry in the air and is then passed three or four times through a flame in order to fix it to the

glass by coagulating the albumen. Having dried and fixed the film, the staining agent (Ziehl's carbol-fuchsin solution) is placed, drop by drop, upon the film. The solution is now heated to boiling several times, more being added as evaporation takes place; and is then washed off with a five-per-cent. solution of sulphuric acid, after which it is treated with ninety-five per cent. alcohol and water until the color entirely disappears. We now place upon the color slip a solution of methylene blue, and allow it to remain unheated about two minutes. This blue solution is then washed off in water, and the preparation is then ready to be mounted and examined microscopically. The peculiarity of this method consists in the fact that while all the bacteria present in the original specimen of sputum are stained by the red carbol-fuchsin solution, all but the *bacillus tuberculosis* part with their color upon the subsequent treatment with sulphuric acid and alcohol. On adding the methylene blue the germs, decolorized by acid and alcohol, will take up the blue color, and our microscopical picture will be a very beautiful contrast of red and blue coloration. The *bacillus tuberculosis*, if present, appears as a bright red, while all else will appear blue. This is a positive sign of tuberculosis. The only germs which have this peculiar reaction are, besides the one already discussed the *Snegma bacillus*, the *bacillus of syphilis*, and the *bacillus of leprosy*. Certain peculiarities are found in their reactions which enable us, by staining process and by knowing the source of the specimen, to substantiate a diagnosis of tuberculosis.

Examination for the bacillus of Typhoid Fever (water analysis in general). It is very rarely that the *Bacillus Typhosis* itself is found in bacteriological examination of water, but as there are present in the normal intestine of man certain bacteria which can be recognized readily by examination, their presence will prove the contamination of water by intestinal contents, and as such the water can be considered an object of suspicion and as a possible source of typhoid contagion. We first obtain the specimen of water, being careful to avoid contamination from any source other than the one under question. We make plate cultures of specimens of this water, using 1, 2, 3, 5, or 10 drops of the water in each plate. Duplicate plates are to be made, one upon gelatin, to be kept at room temperature, and the other upon agar-agar, to be kept in the incubator at 97° F. We then note the number of colonies by certain counting methods, 100 to the cubic centimeter of water being a safe limit. As few bacteria grow at a temperature of 97° F., if we obtain any growth on the agar-agar plates we can be reasonably certain that some polluting germ is present. However, this is by no means certain. The growth should be studied in all its cultural peculiarities, should be inoculated into animals, and all the general bacteriologic principles applied to it. In the case of the *Bacillus Typhosis* and its co-habitator, the *Bacillus Coli-Communis*, we can get no results upon animals, as none have been found susceptible

to their action. A solution known as *Parietti's fluid* (a mixture of hydrochloric acid and alcohol) is used as a method of diagnosing pollution by germs belonging to group of *Coli Communis*. By this method we inoculate a tube with the germ, and then add a few drops of this Parietti's fluid. If we get no growth, we can be sure there are none of the color group present; if a growth is observed, we can be tolerably certain of the presence of some member of this group. Hence this is a negative test. We will not enter into the cultural peculiarities and methods of recognizing the *Bacillus Coli Communis*, and *Bacillus Typhosis*; suffice it to say that by methods pursued, contamination by intestinal contents can be noted both bacteriologically and chemically by presence of chlorides, nitrates, and nitrites. Contamination by Asiatic cholera germs can be recognized by cultural peculiarities and by inoculation experiments. Typhoid Fever germs can be recognized in the urine and feces of a typhoid patient about the tenth day by ordinary methods. A comparatively late method of diagnosis of typhoid fever by bacteriological methods is found in the Widal method. This consists in the addition to the blood of the suspected typhoid patient of a few drops of fresh bouillon culture of typhoid bacilli. If the patient has typhoid fever we will notice, on examining the specimen in the hanging drop under the microscope, that the actively motile typhoid germs are beginning to clump and to lose their motion, until finally they become perfectly passive. The scientific value of this method has as yet not been definitely settled by statistics, but everything seems to point toward its great usefulness as a diagnostic agent. The bacteriological value of typhoid examinations can hardly be overestimated, as contamination may come through air, water, milk, soil, and there is reported a remarkable case of an epidemic of typhoid fever arising from consumption of oysters fattened in brackish water.

Examination of throat in cases of supposed diphtheria. A scraping is made (from one of the whitish plaques on the surface of the mucous membrane of the throat) with a cotton swab. This swab is then rubbed over the surface of a sterile tube or box of Loeffler's blood-serum mixture. It is then to be placed in an incubator or, in the absence of such a contrivance, the test tube may be fastened into the axillary space of the patient and left for 24 hours. At the end of this time the growth which appears on the surface may be examined microscopically. A film of the growth is made on a cover glass in the ordinary way and is then stained for two minutes with a solution of methylene blue. This solution is washed off in water, and the specimen is then mounted and examined. The diphtheria bacillus, if present, presents a peculiar and characteristic appearance. Various bizarre forms, such as club-shaped, dumb-bell, lance-shaped, alternately stained and unstained segments, etc., are noticed so that the germ is easily recognized by its peculiarly characteristic segmentation in staining.

Numerous other examinations could be mentioned, but it is not the purpose of this article to deal completely with the subject. It is sufficient to state that the work done in the Chicago Laboratory is more important than it appears, as it is here that the daily examination of the water supply of the city is made, and it is here that the probable rise and decline of epidemics are noted. It is important to remember that to a more intimate acquaintance with the biological activities of the unicellular vegetable micro-organisms, modern hygiene owes much of its value, and our knowledge of infectious diseases has reached the position it now occupies.

The study of bacteriology may be said to have had its beginning with the observations of Leeuwenhock in the year 1675. In this year he published the fact that he had seen, by means of a lens of his own construction, living motile animalcules in a drop of rain water. Extending his work to the examination of sea water, well water, contents of the intestinal canal of frogs, birds, etc., he found objects that differentiated themselves, the one from the other, by size, shape, and peculiarity of movement. From a study of his work there can be no doubt that he had discovered the bodies now recognized as bacteria. A universal belief in the causal relation of these animalcules to disease arose, and in consequence there was developed a "germ mania." Following this line scientists continued to work, and we find, through the researches of Pasteur, of Pollender, of Davaine and others, the old doctrine of *Contagium animatum* receiving attention. The conclusion necessarily drawn from the work as to the origin of these bodies, is that *omne vivum ex vivo*. The work of Rindfleisch, Klebs, Orth, Eberth, Koch, and others, shows a gradual advance along scientific lines, so that with Koch in 1881, we have our foundation stone of bacteriology solidly laid. Koch proved in that year that distinct varieties of infection, as evidenced by anatomical changes, are due in many cases to the activities of particular specific organisms, and that by proper methods it is possible to isolate these organisms, in pure culture, to cultivate them indefinitely, to reproduce the conditions by inoculation of these pure cultures into susceptible animals and by continuous inoculation from an infected to a healthy animal to continue the disease at will.

R. W. WEBSTER.

Bactria'na (or Bactria), a country of ancient Asia, south of the Oxus and reaching to the west of the Hindu Kush. It is often regarded as the original home of the Indo-European races. A Græco-Bactrian kingdom flourished about the third century B. C., but its history is obscure.

Ba'cup, a borough of England, in Lancashire, 18 mi. n. of Manchester. The chief manufacturing establishments are connected with cotton spinning and power-loom weaving; there are also iron works, Turkey-red dyeing works, and in the neighborhood numerous coal-pits and immense stone quarries. Pop. 23,498.

Badajoz

Badajoz (bá-dá-hōth') (anc. Pax Augusta), the fortified capital of the Spanish province of Badajoz. Pop. 481,508. During the Peninsular War, Badajoz was besieged by Marshal Soult, and taken in March, 1811. It was twice attempted by the English, on May 5 and 29, 1811, and was besieged by Wellington on March 16, and taken April 6, 1812. Pop. town, 27,279.

Badakshan', a territory of Central Asia, tributary to the Ameer of Afghanistan. The chief town is Faizabad. The inhabitants profess Mohammedanism. Pop. 500,000.

Badeau, ADAM, American soldier, b. 1831, in New York. He served on General Grant's staff and retired with a brigadier general's brevet in the regular army. From 1869 to 1881 he was secretary of legation and consul general at London, and accompanied General Grant on his trip round the world (1877-78). He published *Military History of Ulysses S. Grant* (1867-81) and *Grant in Peace* (1886). D. 1895.

Baden (bä'dēn), GRAND-DUCHY OF, one of the more important states of the German Empire. It is divided into four districts: Constance, Freiburg, Karlsruhe, and Mannheim; has an area of 5,824 sq. mi., and a pop. of 1,725,464. It is mountainous, being traversed to a considerable extent by the lofty plateau of the Schwarzwald or Black Forest, which attains its highest point in the Feldberg (4,904 ft.). The hilly parts, especially in the east, are cold and have a long winter, while the valley of the Rhine enjoys the finest climate of Germany. The principal minerals worked are coal, salt, iron, zinc, and nickel. The number of mineral springs is remarkably great, and of these not a few are of great celebrity. The vegetation is peculiarly rich, and there are magnificent forests. The cereals comprise wheat, oats, barley, and rye. Potatoes, hemp, tobacco, wine, and sugar-beet are largely produced. Several of the wines, both white and red, rank in the first class. Baden has long been famous for its fruits also. Of the total area 42 per cent. is under cultivation, 37 per cent. under forest, and 17 per cent. under meadows and pastures. The manufactures are important. Among them are textiles, tobacco and cigars, chemicals, machinery, pottery ware, jewelry (especially at Pforzheim), wooden clocks, confined chiefly to the districts of the Black Forest, musical boxes and other musical toys. The capital is Karlsruhe, about 5 mi. from the Rhine; the other chief towns are Mannheim, Freiburg-im-Breisgau, with a Roman Catholic university; Baden and Heidelberg. Baden has warm mineral springs, which were known and used in the time of the Romans. Heidelberg has a university (Protestant), founded in 1386, the oldest in the present German Empire. The railways have a length of 850 mi., and are nearly all state property. In the time of the Roman Empire southern Baden belonged to the Roman province of Rætia. Under the old German Empire it was a margravate, which in 1533 was divided into Baden-Baden and Baden-Durlach, but reunited in 1771. The title of grand duke was con-

Bagatelle

ferred by Napoleon in 1806, and in the same year Baden was extended to its present limits. In 1870 Baden took an active part in the Franco-Prussian war, and became a member of the German Empire, Nov. 15, 1871. The executive power is vested in the grand duke, the legislative in a house of legislature, consisting of an upper and lower chamber. The revenue and expenditure are each usually about \$10,000,000.

Baden (or Baden-Baden, to distinguish it from other towns of the same name; German, *Bad*, a bath), a town and watering-place, Grand-duchy of Baden, 18 mi. s.s.w. Karlsruhe, built in the form of an amphitheater on a spur of the Black Forest. Baden has been celebrated from the remotest antiquity for its thermal baths. It has many good buildings, and a castle, the summer residence of the grand-duke. Pop. 13,884.

Baden, a town of Austria, 15 mi. s.w. of Vienna. It has numerous hot sulphurous springs, used both for bathing and drinking, and very much frequented. Pop. 11,262. It is generally known as Baden bei Wein.

Baden, a small town of Switzerland, canton Aargau, celebrated for its hot sulphurous baths, which attract many visitors. Pop. 4,020.

Badger (baj'ēr), a plantigrade, carnivorous mammal, allied both to the bears and to the weasels, of a clumsy make, with short, thick legs, and long claws on the forefeet. The common badger (*Meles-vulgaris*) is as large as a middling sized dog, but much lower on the legs, with a flatter and broader body, very thick, tough hide, and long, coarse hair. It inhabits the north of Europe, Asia, and America, burrows, is indolent and sleepy, feeds by night on vegetables, small quadrupeds, etc. Its flesh may be eaten, and its hair is used for artists' brushes in painting. The American badger belongs to a separate genus. *Badger baiting*, or *dracing the badger*, was a barbarous sport formerly practised, generally as an attraction to public-houses of the lowest sort. A badger was put in a barrel, and one or more dogs were put in to drag him out. When this was effected he was returned to his barrel, to be similarly assailed by a fresh set. The badger usually made a most determined and savage resistance.

Badrinath (-āt'), a peak of the main Himalayan range, in Garhwāl District, Northwestern Provinces, India, 23,210 ft. above the sea. On one of its shoulders at an elevation of 10,400 ft. stands a noted temple of Vishnu, which some years attracts as many as 50,000 pilgrims.

Baffin, WILLIAM (1584-1622), an English navigator, famous for his discoveries in the Arctic regions; in 1616 ascertained the limits of Baffin's Bay which is on the n.e. coast of North America between Greenland and the islands that lie on the n. of the continent. He was killed at the siege of Ormuz, in the East Indies.

Bagatelle', a game played on a long, flat board covered with cloth like a billiard-table, with spherical balls and a cue or mace.

Bagdad

At the end of the board are nine cups or sockets of just sufficient size to receive the balls. Nine balls are used, generally one black, four white, and four red, the distinction between white and red being made only for the sake of variety.

Bagdad', capital of a Turkish pashalic of the same name (70,000 sq. mi., 1,000,000 inhabitants), in the southern part of Mesopotamia (now Irak Arabi). The greater part of it lies on the eastern bank of the Tigris which is crossed by a bridge of boats; old Bagdad was on the western bank of the river. Manufactures: leather, silks, cottons, woollens, carpets, etc. Steamers ply on the river between Bagdad and Bassorah, and the town exports wheat, dates, galls, gum, mohair, carpets, etc., to Europe. Bagdad is inhabited by Turks, Arabs, Persians, Armenians, Jews, etc., and a small number of Europeans. Est. pop. over 100,000. The Turks compose three fourths of the whole population. The city has been frequently visited by the plague, and in 1831 was nearly devastated. Bagdad was founded in 762, and is the scene of many of the tales of the *Arabian Nights*.

Bagshot, WALTER (1826-1877), an English economist. For seventeen years he edited the London *Economist*. He was a recognized authority on economic questions and wrote many treatises on banking, the coinage and the history of the money market.

Baghelkand, a tract of country in central India, occupied by a collection of native states (Rewah being the chief), under the governor general's agent for central India. Area 11,323 sq. mi.; pop. 1,512,595.

Bagirmi (bā-gir'mō) (or Baghermi), a Mohammedan negro state in Central Africa, situated between Bornu and Waday, to the s. of lake Tchad.

It is mostly a plain; has an area of about 56,000 sq. mi. and about 1,500,000 inhabitants. The people are industrious, and have attained to a considerable pitch of civilization.

Bagpipe, a musical wind-instrument of very great antiquity, having been used among the ancient Greeks, and being a favorite instrument over Europe generally in the fifteenth



Highland Bagpipe.

Bahrein Islands

century. It still continues in use among the country people of Poland, Italy, the south of France, and in Scotland and Ireland. Though now often regarded as the national instrument of Scotland, especially Celtic Scotland, it is only Scottish by adoption, being introduced into that country from England. It consists of a leathern bag, which receives the air from the mouth, or from bellows; and of pipes, into which the air is pressed from the bag by the performer's elbow. In the common or Highland form one pipe plays the melody; of the three others two are in unison with the lowest A of the chanter, and the third and longest an octave lower, the sound being produced by means of reeds.

Baha'ma Islands (or Lucayos), a group of islands in the West Indies, forming a colony belonging to Britain, lying n. e. of Cuba, and s. e. of the coast of Florida. The principal islands are Grand Bahama, Great and Little Abaco, Andros Islands, New Providence, Eleuthera, San Salvador, Great Exuma, Watling Island, Long Island, Crooked Island, Acklin Island, Mariguana Island, Great Inagua. Of the whole group about twenty are inhabited, the most populous being New Providence, which contains the capital, Nassau, the largest being Andros. Total area 5,450 sq. mi. The soil is a thin but rich vegetable mold, and the principal product is pineapples, which form the most important export. Other fruits are also grown, with cotton, sugar, maize, yams, groundnuts, cocoanuts, etc. Sponges are obtained in large quantity and are exported. The currency is English, but American coins circulate freely. The islands are a favorite winter resort for those afflicted with pulmonary diseases. Watling Island is now by best authorities believed to be same as Guanahani, the land first touched on by Columbus (Oct. 12, 1492) on his first voyage of discovery. The first British settlement was made on New Providence toward the close of the seventeenth century. A number of American Tories settled in the islands after the Revolution. Pop. 47,565, including 14,000 whites.

Bahi'a (bā-ē'á) formerly San Salvador, a town of Brazil, on the Bay of All Saints, province of Bahia. It was founded in 1549, and is the oldest town in Brazil, of which it was capital until 1763. In 1874 it was placed in telegraphic communication with Europe. The harbor is one of the best in S. A.; and the trade, chiefly in sugar, cotton, coffee, tobacco, hides, piassava, and tapioca, is very extensive. Pop. 80,000. The province (area 164,649 sq. mi.; pop. 1,821,089) has much fertile land, both along the coast and in the interior.

Bahia Honda (Port. "deep bay"), a seaport of northern Cuba, 60 mi. w. s. w. of Havana. Pop. 4,823.

Bahrein (bā'rīn) **Islands**, a group of islands in the Persian Gulf, in an indentation on the Arabian coast. The principal island usually called Bahrein, is about 27 mi. in length and 10 in breadth. The principal town is Menamah (or Manama); pop. 3,500. The Bahrein Islands are chiefly noted for their pearl fisheries,

Baiae

which were known to the ancients, and which employ in the season about 400 boats with from 8 to 20 men in each. Total pop. est. 40,000.

Baiae (bī'ā), an ancient Roman watering-place on the coast of Campania, 10 mi. w. of Naples. Many of the wealthy Romans had country houses at Baiae, which Horace preferred to all other places. It became notorious for the vicious lives of its inhabitants. Ruins of temples, baths, and villas still attract the attention of archaeologists.

Baikal (bī'kāl), a large fresh-water lake in Eastern Siberia. Area 14,000 sq. mi. It is surrounded by rugged and lofty mountains; contains seals, and many fish, particularly salmon, sturgeon, and pike. Its greatest depth is over 4,000 ft., and the seal and sturgeon fisheries are important industries. It is frozen over in winter.

Bailey, JAMES MONTGOMERY (1841-1894), American journalist, b. in Albany, N. Y., edited the *Danbury News*, to which he contributed numerous articles which for a time had great vogue. He was known by his signature as "The Danbury Newsman." D. Mch. 4, 1894.

Bailey, PHILIP JAMES, English poet, b. at Basford, Nottingham, 1816. His most remarkable poem, *Festus*, was published in 1839. In 1877 it had reached a tenth edition in England and had been even more read and admired in America.

Baillie, JOANNA (1762-1851), a Scottish authoress, b. at Bothwell, Lanarkshire. She wrote several series of plays. Her only plays performed on the stage were a tragedy entitled *The Family Legend*, brought out at Edinburgh under the patronage of Sir Walter Scott; and *De Montfort*, brought out by John Kemble.

Bailly, JEAN SYLVAIN (1736-1793), first an artist, then astronomer, was b. in Paris. Chosen president of the National Assembly, 1789, and mayor of Paris, July 15, he labored with energy and assiduity to keep the citizens from starvation and revolt. Discords showed themselves in the Assembly and throughout the nation. Finally it became his duty to order the National Guard to fire on the insurgent rabble in the Champs-de-Mars. In November, 1791, he resigned his office. When the Revolution grew more furious and hysterical, he was arrested and guillotined.

Baily, FRANCIS (1774-1844), English astronomer. He published *Tables for the Purchasing and Rencering of Leases*, *The Doctrine of Interest and Annuities*, *The Doctrine of Life Annuities and Assurances*, and an epitome of universal history. On retiring from business in 1825, he turned his attention to astronomy, and became one of the founders of the Astronomical Society.

Baily's Beads, a phenomenon attending eclipses of the sun, the unobscured edge of which appears discontinuous and broken immediately before and after the moment of complete obscuration. It is classed as an effect of irradiation.

Bain, ALEXANDER (1818-1903), an eminent British psychologist and educator, born at

Bajazet

Aberdeen, Scotland, and educated at Marischal College. In 1860 he was made professor of logic and English literature in the University of Aberdeen, a position which he held until 1881, when he was appointed Lord Rector of the University. He is most widely known for his *English Composition and Rhetoric*, but, among scholars, his most enduring fame will rest upon his treatises on psychology. Among these are *A Compendium of Psychology and Ethics*, *The Senses and the Intellect*, *The Emotions and the Will*, and *The Relations of Mind and Body*.

Bainbridge, WILLIAM (1774-1833), American naval officer. When the U. S. navy was reorganized in 1798 he was appointed lieutenant commandant. In 1800 he commanded the frigate *George Washington*, which carried to Algiers the commercial tribute then levied by the dey of that country. In 1801 Bainbridge was captain of the *Essex*, which cruised in the Mediterranean. In 1803 in the U. S. war with Tripoli, he commanded the frigate *Philadelphia* under Commodore Preble, and while chasing a blockade-runner his vessel grounded on a reef and was scuttled and surrendered. The captain and his 315 men were kept as prisoners until the peace in June, 1805. He sailed from Boston, 1812, in command of a squadron comprising the *Constitution*, *Essex*, and *Hornet*. On December 26, off the coast of Brazil, he captured the British frigate *Jara*, of forty-nine guns, for which achievement Congress distributed among the crew \$50,000 as prize money, voted the commodore a gold medal, and to each of his officers a silver one. In 1815 Bainbridge commanded the Mediterranean squadron.

Bairam (bī'ram), the Easter of the Mohammedans, which follows immediately after the Ramadan or Lent (a month of fasting), and lasts three days. Sixty days after this first great Bairam begins the lesser Bairam.

Baird, SPENCER FULLERTON (1823-1887), American naturalist. He was long assistant secretary, and latterly secretary of the Smithsonian Institution, Washington, and was also chief government commissioner of fish and fisheries. He wrote much on natural history, his chief works being, *The Birds of North America* (in conjunction with John Cassin); *The Mammals of North America*; *Review of American Birds in the Smithsonian Institution*; and (with Messrs. Brewer and Ridgeway) *History of North American Birds*.

Baireuth (bī'roit), a town of Bavaria, on the Red Main, 41 mi. n.e. of Nürnberg. The principal edifices, the old and the new palace, are the opera house, the gymnasium, and the national theater. Industries: cotton spinning, sugar refining, musical instruments, sewing machines, leather, brewing, etc. Pop. 24,556.

Baja (bā'yā), a market town of Hungary, district of Baes, on the Danube, with a trade in grain and wine, and a large annual hog fair. Pop. 19,241.

Bajazet (bā-yā-zet') (or Bayasid I) (1389-1409), Turkish emperor, who, in 1389, having strangled his brother Jacob, succeeded his

father Murad (or Amurath). From the rapidity of his conquests he received the name of Ilderim, the Lightning. In three years he subjected Bulgaria, part of Servia, Macedonia, Thessaly, and the states of Asia Minor, and besieged Constantinople for ten years, defeating Sigismund and the allied Hungarians, Poles, and French, in 1395. The attack of Timur (Tamerlane) on Natolia, in 1400, saved the Greek Empire, Bajazet being defeated and taken prisoner by him near Ancyra, Galatia, 1402.

Bajazet II (1447-1512), sultan of the Turks. He increased the Turkish Empire by conquests on the n.w. and in the e., and ravaged the coasts of the Christian states on the Mediterranean, to revenge the expulsion of the Moors from Spain.

Baker, Sir Samuel White (1821-1893), a distinguished English traveler. In 1861 began his African travels, which lasted several years, in the Upper Nile regions, and resulted, among other discoveries, in that of Albert Nyanza Lake in 1864, and of the exit of the White Nile from it. In Africa he encountered Speke and Grant after their discovery of the Victoria Nyanza. In 1869 he returned to Africa as head of an expedition sent by the khedive of Egypt to annex and open up to trade a large part of the newly explored country, being raised to the dignity of pasha. He returned in 1873, having finished his work, and was succeeded by General Gordon. His writings include: *The Rifle and the Hound in Ceylon*; *Eight Years' Wanderings in Ceylon*; *The Albert Nyanza, etc.*; *The Nile Tributaries of Abyssinia*; *Ismailia*; *A Narrative of the Expedition to Central Africa*; *Cyprus as I Saw It*; and *Cast up by the Sea*.

Bake'well, Robert (1726-1795), a famous English agriculturist, b. at Dishley, Leicestershire. He devoted himself to improving the breeding of cattle and sheep, aiming principally at producing the greatest weight of carcass with the smallest amount of feeding, and is to be regarded as the initiator of the system of scientific breeding.

Baking Powder, a mixture of bicarbonate of soda and tartaric acid, usually with some flour added. The water of the dough causes the liberation of carbonic acid, which makes the bread "rise." The process of manufacturing baking powder has grown to be an enormous enterprise in the U. S. The acid ordinarily used in baking powder is cream of tartar. This is obtained from lees of wine and argals, both of which are by-products of the manufacture of wine. This is obtained after the wine has been allowed to stand in the cellar and is the fine substance which settles to the bottom in the casks. The wine is drawn off, leaving this pinkish mass known as lees of wine. It contains about 25 per cent. of cream of tartar. Formerly the lees were sold for fertilizers and the argals were burned for lampblack, but since baking powder has come into general use the demand for both has become great. These products are brought to the factory from France, Italy, and Spain, and after being crushed to a fine powder, are boiled in huge

copper tanks. As the solution cools, the cream of tartar crystallizes on the side of the tank, and the other impurities either remain in the solution or form a precipitate in the bottom. The crystals, which are of a faded brown color, are scraped off, redissolved, and discolored by passing through a filter of animal coal. The crystals, after this process, are white and almost perfectly pure and ready for use in the baking powder manufactory. With the soda and starch it is then brought to the chemical laboratory and analyzed. The process of manufacturing begins on the top floor, where the crystals of cream of tartar are fed into the hopper of a grinding machine from which it comes out as fine white powder. It is sifted through a number of bolting screens, then barreled and placed along with the soda and starch. In the floor are three trapdoors, one for the cream of tartar, one for the soda, and one for the starch. Below the floor are three bins, which narrow to funnels, the mouths of which are covered with draw slides. Under each spout is a weighing scale over which runs a truck track, which continues on around over two traps in the floor. The truck is put under the cream of tartar spout and filled with just the proper amount and is then dumped into a bin below, then a certain amount of soda and starch is added in the same manner. The starch is added as a filler to separate the particles of cream of tartar and soda and aids in preventing a chemical combination until water is added. The ingredients are then thoroughly mixed and samples are placed in small boxes and sent to the laboratory for analysis. The powder is then put in boxes, labeled and ready for the market. Instead of cream of tartar, alum and alum-ammonia are extensively used as the acid element. They are less expensive but the law in several states prohibits their use. Ammonia may be detected in baking powder by mixing a portion with water and boiling thoroughly for a few minutes. If there is ammonia it may be detected by the smell in the rising steam. Alum may be detected by placing some of the powder in a glass of cold water. If there is no effervescence, alum powder is present.

Baku (bä-kö'), a Russian port on the western shore of the Caspian. The naphtha or petroleum springs of Baku have long been known; and the Field of Fire, so called from emitting inflammable gases, has long been a place of pilgrimage with the Guebres or Fire-worshippers. About 400 oil wells are in operation. Some of the wells have had such an outflow of oil as to be unmanageable. Baku is the station of the Caspian fleet, is strongly fortified, and has a large shipping trade. Pop. 112,253.

Bakunin, Michael (1814-1878), the founder of Nihilism, born of a noble Russian family, became associated with a band of students who studied German philosophy. Among these were Herzen, Turgenieff, the novelist, and Belinski. He went to Berlin in 1841, was expelled from that city and from various continental capitals as a revolutionist, and participated in the insurrection at Dresden in 1848.

Balaam

He spent eight years in prisons in Austria and Russia, was banished to Siberia in 1856, and escaped from there in an American vessel. He joined the staff of Herzen's revolutionary organ, the *Ko'okol*, in London, but his ideas were too far advanced for his associates. He quarreled with Karl Marx and Mazzini. He went to Switzerland, where he preached Nihilism, and died suddenly at Berne. He demanded the entire abolition of the state as a state, the absolute equalization of individuals, and the extirpation of hereditary rights and of religion, his conception of the next stage of social progress being purely negative and annihilatory.

Balaam (bā'lam), a heathen seer, invited by Balak, king of Moab, to curse the Israelites, but compelled by miracle to bless them instead (Numbers 22-24). In another account he is represented as aiding in the perversion of the Israelites to the worship of Baal, and as being, therefore, slain in the Midianitish war (Numbers 31; Joshua 13).

Balaklava (bā-lā-klā'vā), a small seaport in the Crimea, 8 mi. s. s. e. Sebastopol. In the Crimean War it was captured by the British, and a battle took place here October, 1854, wherein the Russians were defeated. In this contest occurred the "Charge of the Light Brigade" rendered famous by Tennyson's poem.

Balance, an instrument employed for ascertaining and determining the quantity of any substance equal to a given weight. Balances are of various forms; in that most commonly used a horizontal beam rests so as to turn easily upon a certain point known as the center of motion. From the extremities of the beam, called the centers of suspension, hang the scales, and a slender metal tongue midway between them, and directly over the center of motion, indicates when the beam is level. The characteristics of a good balance are: 1, that the beam should rest in a horizontal position when the scales are either empty or loaded with equal weights; 2, that a very small addition of weight put into either scale should cause the beam to deviate from the level, which property is denominated the *sensibility* of the balance; 3, that when the beam is deflected from the horizontal position by inequality of the weights in the scales, it should have a tendency speedily to restore itself and come to rest in the level, which property is called the *stability* of the balance. To secure these qualities the arms of the beam should be exactly similar, equal in weight and length, and as long as possible; the centers of gravity and suspension should be in one straight line, and the center of motion immediately above the center of gravity; and the center of motion and the centers of suspension should cause as little friction as possible. The center of motion ought to be a knife-edge; and if the balance requires to be very delicate, the centers of suspension ought to be knife-edges also. For purposes of accuracy, balances have occasionally means of raising or depressing the center of gravity, of regulating the length of the arms, etc., and the whole apparatus is not unfrequently enclosed

Balboa

in a glass case, to prevent the heat from expanding the arms unequally, or currents of air from disturbing the equilibrium.

Of the other forms of balance, the Roman balance, called *steelyard*, consists of a lever moving freely upon a suspended fulcrum, the shorter arm of the lever having a scale or pan attached to it, and the longer arm, along which slides a weight, being graduated to indicate quantities. It is commonly used for weighing loaded carts, for luggage at railway stations, etc. A variety of this, the Danish balance, has the weight fixed at the end of the lever, the fulcrum being movable along the graduated index. The *spring-balance* shows the weight of articles by the extent to which they draw out or compress a spiral spring. It is of service where a high degree of exactness is not required, and finds application in the dynamometer for measuring the force of machinery. An extremely ingenious balance, used in the mint and the Bank of England for weighing "blanks" and sovereigns, distributes them automatically into three compartments according as they are light, heavy, or the exact weight.

Balance of Power, a political principle which first came to be recognized in modern Europe in the sixteenth century, though it appears to have been also acted on by the Greeks in ancient times in preserving the relations between their different states. The object in maintaining the balance of power is to secure the general independence of nations as a whole, by preventing the aggressive attempts of individual states to extend their territory and sway at the expense of weaker countries. The first European monarch whose ambitious designs induced a combination of other states to counteract them, was the Emperor Charles V; similar coalitions being formed in the end of the seventeenth century, when the ambition of Louis XIV excited the fears of Europe, and a century later against the exorbitant power and aggressive schemes of the first Napoleon. More recently still we have the instance of the Crimean War, entered into to check the ambition of Russia. Of late years there has been a marked tendency among British politicians to decry and impugn the principle of the balance of power, as calculated only to propagate a system of mutual hostility, and retard the cause of progress, by the expenditure both of money and life thus occasioned. There can be no doubt, however, that to the carrying out of this principle the independence of some of the smaller and weaker European states is fairly attributable.

Bal'aton (or Plattensee), a lake of Hungary, 55 mi. s.w. of Pesth; length 50 mi.; breadth, 3 to 10 mi.; area about 390 sq. mi. Of its thirty-two feeders the Szala is the largest, and the lake communicates with the Danube by the rivers Sio and Sarviz. It abounds with a species of perch.

Balbo'a, VASCO NUNEZ DE (1475-1517), one of the early Spanish adventurers in the New

World. Having dissipated his fortune, he came to America, and was at Darien with the expedition of Francisco de Enciso in 1510. An insurrection placed him at the head of the colony, but rumors of a western ocean and of the wealth of Peru led him to cross the isthmus. On Sept. 25, 1513, he saw for the first time the Pacific, and after annexing it to Spain, and acquiring information about Peru, returned to Darien. Here he found himself supplanted by a new governor, Pedrarias Davila, with much consequent grievance on the one side, and much jealousy on the other. Balboa submitted, however, and in the following year was appointed viceroy of the South Sea. Davila was apparently reconciled to him, and gave him his daughter in marriage, but shortly after had him beheaded on a charge of intent to rebel. Pizarro, who afterward completed the discovery of Peru, served under Balboa.

Balch, GEORGE B., b. 1821, in Tennessee. He entered the navy in 1837; was many years on foreign service and participated in the attack on Vera Cruz. He served in the South Atlantic squadron during the Civil War and commanded the *Patnee*. He became commodore, 1872, rear admiral, 1878, and was superintendent of the naval academy until 1879. He was placed on the retired list in 1883.

Balder (or Baldur), a Scandinavian divinity, represented as the son of Odin and Frigga, beautiful, wise, amiable, and beloved by all the gods. He is believed to be a personification of the brightness and beneficence of the sun.

Baldness, loss of the hair, complete or partial, usually the latter, and due to various causes. Most commonly it results as one of the changes belonging to old age, due to wasting of the skin, hair sacs, etc. It may occur as a result of some acute disease, or at an unusually early age, without any such cause. In both the latter cases it is due to defective nourishment of the hair, owing to lessened circulation of the blood in the scalp. The best treatment for preventing loss of hair seems to consist in such measures as bathing the head with cold water and drying it by vigorous rubbing with a rough towel and brushing it well with a hard brush. Various stimulating lotions are also recommended, especially those containing cantharides. But probably in most cases senile baldness is unpreventable. When extreme scurfiness of the scalp accompanies loss of the hair an ointment that will clear away the scurf will prove beneficial.

Baldwin I (1172-1206), emperor of Constantinople. His courage and conduct in the fourth crusade led to his unanimous election as Emperor of the East after the capture of Constantinople by the French and Venetians in 1204. Baldwin marched on Adrianople against Greek revolutionists, but was taken prisoner and died in captivity.

Baldwin II (1217-1270), fifth and last Latin emperor of Constantinople. During his minority John de Brienne was regent, but on his assuming the power himself the empire fell to pieces. In 1261 Constantinople was taken, and Baldwin retired to Italy.

Baldwin I, king of Jerusalem, reigned 1100-18, having assumed the title which his elder brother Godfrey de Bouillon had refused. **BALDWIN II**, his cousin and successor, reigned from 1118-31. During his reign the reduction of Tyre and institution of the order of Templars took place. **BALDWIN III**, king of Jerusalem from 1143 to 1162, was son and successor of Foulques of Anjou. He devoted himself to the hopeless task of improving the kingdom and establishing the Christian chivalry in the East.

Baldwin, CHARLES H. (1822-1888), b. in New York City. He entered the navy in 1839, became a lieutenant in 1853, commander in 1862, and captain in 1869. He served in the Mexican War, being stationed on the west coast. He was in command of one of the steamers of the mortar flotilla when Farragut's fleet passed forts St. Phillip and Jackson in 1862, and at the attack of Vicksburg in June, 1862.

Baldwin, HENRY, LL.D. (1779-1844), b. at New Haven, Conn. He was elected to Congress several times from the state of Pennsylvania, and in 1830 was appointed a judge of the Supreme Court of the U. S.

Baldwin, MATTHIAS W. (1795-1866), b. in New Jersey. He is given credit for having constructed the first locomotive in America, the "*Ironsides*," and for making several improvements in locomotives.

Baldwin, ROGER SHERMAN, LL.D. (1793-1863), an American statesman, b. in New Haven, Conn. He became governor of his native state in 1844, and was sent to the U. S. Senate in 1847. He was associated with J. Q. Adams in the famous Amistad trial in 1841.

Baleares, a group of five islands, southeast of Spain, including Majorca, Minorca, Iviza, and Formentera. The popular derivation of the ancient name, Baleares, has reference to the repute of the inhabitants for their skill in slinging, in which they distinguished themselves both in the army of Hannibal, and under the Romans, by whom the islands were annexed in 123 B. C. They were taken by James I, king of Arragon, 1220-34, and constituted a kingdom, which in 1375 was united to Spain. The islands now form a Spanish province, with an area of 1,860 sq. mi., and 312,593 inhabitants.

Baleen, the term applied to the horny plates attached to the palate of the whalebone whales, and which constitute the "whalebone" of commerce. The baleen plates are arranged in a double row on the palate, and depend into the cavity of the mouth of the whale. The length of the largest plates averages from 10 to 14 feet; while in number about 200 plates exist on each side of the mouth. The huge fringe acts as a kind of sieve or strainer in serving to prevent substances of large bulk from gaining access to the throat, and also in entangling the minute forms upon which the whale feeds.

Balfé, MICHAEL WILLIAM (1808-1870), a British musician, was b. in Dublin. When only sixteen he conducted the orchestra at Drury Lane Theater. He afterward studied

Balfour

music in Italy. In 1845 he was made conductor of the Italian Opera, Covent Garden. His principal works are operas. The best-known are, *The Bohemian Girl* (1844), and *The Rose of Castile* (1857). His latest productions were *Satanella*, *The Puritan's Daughter*, *Blanche de Nevers*, and *The Sleeping Queen*.

Bal'four, RIGHT HON. ARTHUR JAMES, M. P., a noted English statesman of the present day, was b. in 1848, and in 1856, succeeded his father in the estate of Whittinghame, Haddingtonshire. He was educated at Eton and Trinity College, Cambridge, and in 1874 was returned to Parliament as Conservative member for Hetford. Public attention was soon drawn to him by his quickness of perception and readiness in debate, and he has now become one of the most effective speakers in the House. From 1878 to 1880 he was private secretary to his uncle, Lord Salisbury, foreign secretary in Lord Beaconsfield's ministry, and he accompanied that nobleman to the Berlin Congress. On the accession to power of Mr. Gladstone, in 1880, he for a time formed one of Lord Randolph Churchill's "Fourth Party," and in 1882 fiercely assailed the government on the Kilmainham Treaty question. At the election of 1885 he was returned for East Manchester, a seat which he still retains. He was appointed president of the Local Government Board in 1885, secretary for Scotland in 1886, and chief secretary for Ireland in 1887-91. On the death of W. H. Smith, in 1891, he became first lord of the treasury and leader of the House.

With the exception of the brief interval when the Liberals were in power he held this position until July, 1902, when, on the resignation of Lord Salisbury, King Edward appointed him premier and asked him to form a cabinet. He is the author of *The Foundations of Scholarly and Philosophic Belief* and *The Defense of Philosophic Doubt*, works which have attracted more than ordinary attention.

Balfour', SIR JAMES, lord president of the Court of Session, and son of Sir Michael Balfour, of Pittendreich, in Fifeshire, was one of the most dubious politicians of the Reformation period in Scotland. He, however, succeeded in achieving considerable personal and professional success, attaining in the end the lord presidency of the Court of Session. He d. in 1583.

Balfour, JOHN HUTTON (1808-1884), a distinguished Scotch botanist. He established the Botanical Society of Edinburgh, was professor of botany in Glasgow University, and a fellow of the Royal Society. He was for thirty years dean of the medical faculty of the University of Edinburgh.

Balfroosh' (or Barfurush'), a town, Persia, province of Mazanderan, about 12 mi. from the Caspian, a great emporium of the trade between Persia and Russia. Pop. est. 50,000.

Ba'li, an island of the Indian Archipelago, e. of Java, belonging to Holland; area about 2,260 sq. mi. Principal products: rice, cocoa, coffee, indigo, cotton, etc. It is divided into eight

Bali

provinces under native rajahs, and forms one colony with Lombok, the united population being 863,725, of whom 300,000 may belong to Bali.

Bal'iol (or Balliol), JOHN DE, of Barnard Castle, Northumberland, father of king John Baliol, a great English or Norman baron in the reign of Henry III. In 1263 he laid the foundation of Balliol College, Oxford, which was completed by his widow Devorguilla (or Devorgilla). His son, John Baliol, became temporary king of Scotland. He d. 1269.

Bal'iol (1249-1315) (or Balliol), JOHN, king of Scotland. On the death of Margaret, Baliol claimed the vacant throne by virtue of his descent from David, Earl of Huntingdon, brother to William the Lion. Robert Bruce opposed Baliol; but Edward I's decision was in favor of Baliol. Irritated by Edward's harsh exercise of authority, Baliol concluded a treaty with France, then at war with England; but after the defeat at Dunbar he surrendered his crown into the hands of the English monarch. He was sent with his son to the Tower, but in 1297 obtained liberty to retire to his Norman estates, where he died. His son, Edward, in 1332, landed in Fife with an armed force, and having defeated a large army under the regent Mar, got himself crowned king, but was driven out in three months.

Balk'an (Arab. "high ridge;" anciently Hæmus, "the wintry or snowy mountains"), the most eastern branch of the great Alpine system of Central Europe, extends from the plain of Sophia to the Black Sea, separating Bulgaria from Rumili, and forming the watershed between the Danube and the Maritza. Tchar-dagh (9,700 ft.) in the w. part, is its highest peak. The B. is crossed by 6 roads, over as many passes, the most important of which is the Porta Trajani, which forms the overland route between Vienna and Constantinople. As a political boundary it divides Bulgaria from Eastern Roumelia.

Balkan Free States: Bulgaria, Eastern Roumelia, Roumania, and Servia.

Balkash' (or Balkhash) (bál-hásh'), a salt lake in Russian Central Asia, area 8,500 sq. mi., depth nowhere more than 80 ft.

Balkh (bákh or bákh), a city in the north of Afghanistan, in Afghan Turkestan, at one time the emporium of the trade between India, China, and Western Asia. In 1220 it was sacked by Genghis Khan, and again by Timur in the fourteenth century. A new town has risen up an hour's journey n. of the old, the residence of the Afghan governor, with a population of about 25,000.

Bal'kis, the Arabian name of the Queen of Sheba who visited Solomon. She is the central figure of innumerable Eastern legends and tales.

Ball, Game of. Ball-playing was practised by the ancients, and old and young amused themselves with it. The Phæacian damsels are represented in the Odyssey as playing it to the sound of music, and Horace represents Mæcenas as amusing himself thus in a journey. In the Greek gymnasia, the Roman baths, and in many Roman villas, a *sphaisterium* (a place

appropriated for playing ball) was to be found; the games played being similar to those indulged in at the present day. In the Middle Ages the sport continued very popular both as an indoor and outdoor exercise, and was a favorite court pastime until about the end of the eighteenth century. In England foot-ball and tennis are mentioned at an early date, and a favorite game prior to the English revolution was one in which a *mall* or mallet was used, hence the name *pall-mall* for the game and the place where it was played. The most popular modern forms are *Cricket*, *Base ball*, *Foot ball*, *Golf*, *Lawn-tennis*, and *Polo* (which see).

Ball, JOHN, an itinerant preacher of the fourteenth century, excommunicated about 1367 for promulgating "errors, schisms, and scandals against the pope, archbishops, bishops, and clergy." He was one of the most active promoters of the popular insurgent spirit which found vent under Wat Tyler in 1381.

Ball, SIR ROBERT STAWELL, a British astronomer, was b. in Dublin, July 1, 1840, and studied at Trinity College. In 1865 he was appointed Lord Rosse's astronomer at Parsonstown; in 1873 Professor of Applied Mathematics at the Royal Irish College of Science; and in 1874 Professor of Astronomy at Dublin, and Astronomer Royal for Ireland. He has published several works on mechanics and astronomy as, *The Story of the Heavens*, *In Starry Realms*, and *In the High Heavens*, besides many articles in various magazines.

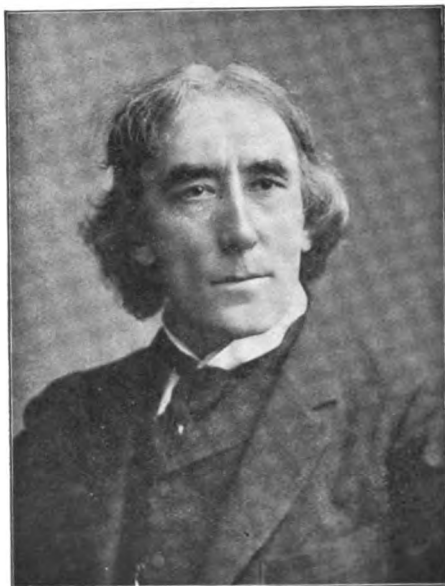
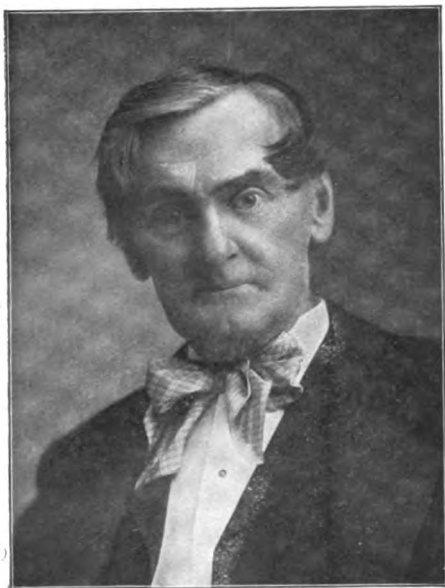
Ball, THOMAS (1819 —), American sculptor, born in Charlestown, Mass. He studied in Europe, and in 1865 settled in Florence. Among his works are the equestrian statue of Washington at Boston, the Webster statue in Central Park, New York, and the Emancipation group at Washington, D. C.

Ballad, a term loosely applied to various poetic forms of the song type, but in its most definite sense a poem in which a short narrative is subjected to simple lyrical treatment. The ballad is probably one of the earliest forms of rhythmic poetic expression, constituting a species of epic in miniature, out of which by fusion and remodeling, larger epics were sometimes shaped. As in the folk-tales, so in the ballads of different nations, the resemblances are sufficiently numerous and close to point to the conclusion that they have often had their first origin in the same primitive folk-lore or popular tales. But in any case, excepting a few modern literary ballads of a subtler kind, they have been the popular expression of the broad human emotions clustering about some strongly outlined incidents of war, love, crime, superstition, or death. It is probable that in the Homeric poems fragments of older ballads are embedded; but the earliest ballads, properly so called, of which we have record were the *ballisteia* or dancing songs of the Romans, of the kind sung in honor of the deeds of Aurelian in the Sarmatic War by a chorus of dancing boys. In their less specialized sense of lyric narratives, their early popularity among the Teutonic race is evi-

denced by the testimony of Tacitus, of the Gothic historian Jornandes, and the Lombard historian Paulus Diaconus; and many appear to have been written down by order of Charlemagne and used as a means of education. Of the ballads of this period, however, only a general conception can be formed from their traces in conglomerates like the *Nibelungenlied*; the more artificial productions of the *Minnesänger* and *Meistersänger* overlying the more popular ballad until the fifteenth century, when it sprang once more into vigorous life. A third German ballad period was initiated by Bürger under the inspiration of the revived interest in the subject shown in Great Britain and the publication of the *Percy Reliques*; and the movement was sustained by Herder, Schiller, Goethe, Heine, Uhland, and others. The earlier German work is, however, of inferior value to that of Scandinavia, where, though comparatively few manuscripts have survived, and those not more than three or four centuries old, a more perfect oral tradition has rendered it possible to trace the original stock of the twelfth century.

Of the English and Scottish ballads anterior to the thirteenth century there are few traces beyond the indication that they were abundant, if indeed anything can be definitely ascertained of them earlier than the fourteenth century. Among the oldest may be placed *The Little Guest of Robin Hood*, *Hugh of Lincoln*, *Sir Patrick Spens*, and the *Battle of Otterbourn*. In the fifteenth century specimens multiplied rapidly; ballad-making became in the reign of Henry VIII a fashionable amusement, the king himself setting the example; and though in the reign of Elizabeth ballads came into literary disrepute and ballad singers were brought under the law, yet there was no apparent check upon the rate of their production. Except perhaps in the n. of England and s. of Scotland, there was, however, a marked and increasing tendency to vulgarization as distinct from the preservation of popular qualities. The value of the better ballads was lost sight of in the flood of dull, rhythmless, and frequently scurrilous verse. The modern revival in Britain dates from the publication of *Ramsay's Evergreen and Tea-Table Miscellany* (1724-27) and of the selection made by Bishop Percy from his seventeenth-century MS. (1765), a revival not more important for its historic interest than for the influence which it has exercised upon all subsequent poetry.

The threefold wave discernible in German, if not in British, ballad history, is equally to be traced in Spain, which alone among the Latinized countries of Europe has songs of equal age and merit with the British historic ballads. The principal difference between them is, that for the most part the Spanish romance is in trochaic, the British ballad in iambic meter. The ballads of the *Cid* date from about the end of the twelfth and beginning of the thirteenth century; and then followed an interval of more elaborate production, a revival of ballad interest in the sixteenth cen-



ACTORS

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Ballantyne

tury, a new declension, and finally a modern and still persisting enthusiasm.

The French poetry of this kind never reached any high degree of perfection, the romance, farce, and lyric flourishing at the expense of the ballad proper. Of Italy much the same may be said, though Sicily has supplied a great store of ballads; and nearly all the Portuguese poetry of this kind is to be traced to a Spanish origin. The Russians have lyric-epic poems, of which some, in old Russian, are excellent, and the Servians are still in the ballad-producing stage of civilization. Modern Greece has also its store of ballads, to which Madame Chenier called attention in the middle of last century. Both in Greece and Russia and in the Pyrenees the old habit of improvising song as an accompaniment to dance still exists.

Bal' lantyne, JAMES (1772-1833), the printer of Sir W. Scott's works. Successively a solicitor and a printer in his native town, at Scott's suggestion he removed to Edinburgh, where the high perfection to which he had brought the art of printing, and his connection with Scott, secured him a large trade. His firm was involved in the bankruptcy of Constable & Co., by which Scott's fortunes were wrecked, but Ballantyne was continued by the creditors' trustee in the literary management of the printing house.

Ballantyne, ROBERT M. (1825-1894), a prolific British writer of tales for boys. His experiences acquired in the backwoods of Rupert's Land, among the fur-traders and Red Indians, in the Bell Rock Lighthouse, in a visit to the Cape, have all been utilized in producing sound, wholesome, and interesting tales.

Bal' arat, a city and gold field of the colony of Victoria, Australia, 96 mi. w. n. w. of Melbourne. B. was the scene of one of the earliest gold discoveries in Victoria, in June, 1851, and is still the principal gold-producing district of the colony. Quartz mining is now the leading feature of the district, and auriferous reefs are remuneratively worked at a depth of 900 and 1,000 ft. The town of B. consists of two distinct municipalities, B. East and B. West, with an aggregate population of 44,766. It has iron-foundries, breweries, and distilleries, several flour mills, and other factories. It is connected by railway with Melbourne.

Ball-cock, a kind of self-acting stop-cock, opened and shut by means of a hollow sphere or ball of metal attached to the end of a lever connected with the cock. Such cocks are often employed to regulate the supply of water to cisterns. The ball floats on the water in the cistern by its buoyancy, and rises and sinks as the water rises and sinks, shutting off the water in the one case and letting it on in the other.

Ball-flower, an architectural ornament resembling a ball placed in a circular flower, the three petals of which form a cup round it; usually inserted in a hollow molding, and generally characteristic of the Decorated Gothic style of the fourteenth century.

Bal' liol College, Oxford, was founded about 1263 by John Balliol (or Baliol) of Barnard

Balloon

Castle, Durham, and Devorgilla, his wife (parents of John Balliol, king of Scotland). There are a large number of valuable scholarships and exhibitions, including the Snell exhibitions, fourteen in number, held by students from Glasgow University.

Ballis' tic Pendulum, an apparatus invented by Robins, toward the close of the eighteenth century, for ascertaining the velocity of military projectiles, and consequently the force of fired gunpowder. A piece of ordnance is fired against bags of sand supported in a strong case or frame suspended so as to swing like a pendulum. The arc through which it vibrates is shown by an index, and the amount of vibration forms a measure of the force or velocity of the ball.

Balloon, a gas-tight bag or envelope, generally pear-shaped when inflated with hydrogen, coal-, or other gas, from which a car or basket is suspended from netting, used for purposes of ascension in free air. The balloon is provided with a suitable valve, operated by a rope which is within reach of the person in the car, by which the gas is permitted to escape when it is desired to descend to the earth. Bags filled with sand are carried in the car, and the *Aeronaut*, or balloonist, empties the sand bag when he desires to rise to a higher altitude. Balloons generally are made of a strong silk. Hot-air balloons use heated air instead of gas for inflation.

Following are some of the principal events in the developments of balloons: 1757, Galien of Avignon wrote on aerostation; 1767, Dr. Black of England ascertained that a light envelope filled with hydrogen gas would ascend; 1783, hot-air balloon invented by Stephen and Joseph Montgolfier, paper manufacturers at Annonay, near Lyons, France. In June of that year, a captive hot-air balloon was made to ascend over 2,000 yds. August 27, a hydrogen balloon made by two brothers by the name of Roberts, under the superintendence of M. Charles, professor of natural philosophy, Paris, was sent up from the Champs de Mars, Paris. This balloon remained in the air three quarters of an hour, fell in a field 15 mi. distant from the place of ascension. Peasants were so terrified at the appearance of the balloon that they tore it to shreds. September 19, Joseph Montgolfier repeated his former experiment at Versailles. The balloon carried, in a basket suspended from the bag, a sheep, a cock, and duck, the first of living creatures to navigate in the air. October 15, M. Francois Pilatre de Rozier, a young French naturalist, ascended in a captive balloon, the first man to make a balloon ascension. November 21, de Rozier and the Marquis d'Arlandes made the first ascension in a free balloon. The result was successful. This was a fire balloon. December 1, MM. Charles and Robert ascended in Paris, in a balloon inflated with hydrogen gas. Professor Charles invented the balloon valve at the top, and suspended the car from a hoop attached to netting. The first balloon ascension in America was made in Philadelphia soon after the Montgolfier experiment.

Ballon

The balloon consisted of 45 small hydrogen balloons, and James Wilcox, a carpenter, made the first ascension. In 1794 balloons were introduced into the French army and used for making observations at the battles of Liege, and Fleurus, and the sieges of Mentz and Ehrenbreitstein. Guy Lussac, a celebrated French chemist, in 1804, reached an altitude of 23,040 ft., and carried up instruments for making scientific observations of the character and properties of the atmosphere at great heights. In 1820 Charles Green, in England, introduced the practise of inflating balloons with illuminating gas. Messrs. Holland, Green, and Mason, in 1836, ascended from London in a balloon of 85,000 cu. ft. capacity, and made a voyage of 500 mi. In 1852 Henri Giffard, a young French engineer, built an elongated balloon, filled with coal gas, driven by an aerial screw propeller actuated by a steam engine. September 24, he made an ascension. He was able to make a change in direction in spite of the wind, and this was the first navigable balloon propelled by a motor. Wise, the celebrated American balloonist, made an ascension from St. Louis in 1859 and landed in Jefferson co., N. Y., having traveled a distance of 1,150 miles. In 1872 Dupuy de Lome, chief naval constructor of the French government, tested a navigable balloon, in which the propeller was actuated by 14 men in the car. The experiment was fairly successful. The first electrical navigable balloon was built and tested in 1883. Built by Gaston Tissandier of France. The apparatus was driven by a Siemens motor weighing 99 pounds, actuated by a primary bichromate of potash battery, weighing 517 pounds, capable of developing $1\frac{1}{2}$ horse power for $2\frac{1}{2}$ hours. The screw was 9.18 ft. in diameter with two arms, and rotated at 180 revolutions a minute. First ascension made October 8, and the aeronaut succeeded in sailing against the wind and performing several evolutions. The aeronautical establishment of the French war department built an electrical navigable balloon which was the first that ever returned to its moorings after ascending. It was constructed in 1884 under the superintendence and according to the plans of Renard and Krebs, French army officers. The elongated balloon was 165 ft. in length and $27\frac{1}{2}$ ft. in diameter, and the screw was placed in front. This *air ship*, named *La France*, had a car 105 ft. long. The electric motor was of 9 horse power, and the screw, of two arms, was 27 ft. in diameter. Aug. 9, 1894, a trial was made. The air ship proved perfectly manageable, made a speed of $10\frac{1}{2}$ mi. an hour, and was returned to its landing. Other trials proved that the air ship was a navigable balloon.

General McClellan organized a balloon corps in connection with the Army of the Potomac, and more than fifty balloons were used at the siege of Paris, during the Franco-Prussian war, to carry mail out of the beleaguered city.

Balloons intended for long voyages or for carrying heavy loads need to be of great size and proper proportions. The largest balloon ever

Ballot

constructed was the fire balloon of Eugene Goddard, of France, in 1864. It had a capacity of 500,000 cubic feet. In 1874 a balloon having a capacity of 400,000 cubic feet was made in New York. The celebrated American aeronaut, Mr. John Wise, intended to cross the Atlantic in this balloon, but it burst while being filled. The longest distance traveled in the United States by a balloon was made by Messrs. Wise and La Mountain, who went from St. Louis, Mo., to Jefferson County, N. Y., a distance of 1,115 miles, in 24 hours.

Balloon racing has recently attracted considerable attention among the French, and the management of the Paris Exposition of 1900 arranged for two races. The first started on September 30th and the second on October 9th. The voyages made by the winners of the first and second prizes at the second race exceed all previous records, both in length of time in which the balloons were kept in the air and the distance covered. Comte de la Vaulx, the winner of the first prize, continued his voyage for 35 hours and 45 minutes, and travelled from Paris to Korosticheff, Russia, 1,925 kilometers (1,193 miles), and attained a maximum altitude of 5,700 meters (18,810 feet.) M. Balson, winner of the second prize, traveled 1,360 kilometers (843 miles) in 27 hours and 25 minutes.

The only useful results that have been attained from balloon ascensions are those connected with military operations, and a few observations of a meteorological nature; those of the latter class pertain to the variation in the pressure of the atmosphere at different altitudes, and the relation of the upper to the lower atmospheric currents. See *Flying Machines*.

Balloon-fish, a curious tropical fish that can inflate itself so as to resemble a ball.

Ballot, voting by, signifies literally voting by means of little balls (called by the French *ballottes*), usually of different colors, which are put into a box in such a manner as to enable the voter, if he chooses to conceal for whom or for what he gives his suffrage. The method is adopted by most clubs in the election of their members—a white ball indicating assent, a black ball dissent. Hence, when an applicant is rejected, he is said to be *blackballed*. The term voting by ballot is also applied in a general way to any method of secret voting, as, for instance, when a person gives his vote by means of a ticket bearing the name of the candidate whom he wishes to support. In this sense vote by ballot is the mode adopted in electing the members of legislative assemblies in most countries, as well as the members of various other bodies. In ancient Greece and Rome the ballot was in common use. In the U. S. the ballot was in use in early colonial times, and was made compulsory in the constitutions of New Jersey, Pennsylvania, and all other states. The Australian ballot system, originated within ten years in the British colonies, has recently been adopted by law in several of the U. S. By a carefully contrived system of secluding each voter at the polls, and marking and folding the ballots, it claims to

Ballymena

secure greater secrecy and honesty than any other method of voting.

Ballyme'na, a town, Ireland, county Antrim, 22 mi. from Belfast, with a considerable trade in linens and linen yarns, the manufacture of which is carried on to a great extent. Pop. 8,655.

Balm, a fragrant perennial herb belonging to the order Labiatae, a native of the south of Europe and Western Asia, and naturalized in a few places in England, has long been cultivated in gardens. The stems and leaves are still occasionally used in medicine as a gentle stimulant and tonic, and were formerly in high repute. The taste is somewhat austere and slightly aromatic. The quantity of essential oil, on which its whole qualities depend, is not more than sufficient to communicate a pleasant flavor to the infusion. A variety of the common catmint, with a smell like that of balm, is often mistaken for it. Moldavian Balm is a native of Eastern Europe, Siberia, etc. Bastard Balm, a native of the south of England and of many parts of Europe, is a very beautiful plant, which when dried has a delightful fragrance, and retains it long.

Balmaceda, JOSE MANUEL (1840-1891), Chilean statesman, early distinguished as a political orator; advocated in Congress separation of church and state; as premier, in 1884, introduced civil marriage; elected president in 1886. A conflict with the Congressional party, provoked by his alleged cruelties and official dishonesty, resulted in Balmaceda's exile and suicide.

Balm of Gilead, the exudation of a tree, a native of Arabia Felix, and also obtained from another closely allied species. The leaves of the former tree yield when bruised a strong aromatic scent; and the balm of Gilead of the shops, or balsam of Mecca or of Syria, is obtained from it by making an incision in its trunk. It has a yellowish or greenish color, a warm, bitterish, aromatic taste, and an acidulous fragrant smell. It is valued as an odoriferous unguent and cosmetic.

Balmor'al Castle, the Highland residence of Victoria, Queen of England, beautifully situated on the s. bank of the Dee, in the county of, and 45 mi. w. of Aberdeen. It stands in the midst of fine and varied mountain scenery, is built of granite in the Scottish baronial style, has been recently (1888) enlarged, and has a massive and imposing appearance. The estate, which is the queen's private property, extends to 25,000 acres, mostly deer forest.

Balsa, a kind of raft or float used on the coasts and rivers of Peru and other parts of South America for fishing, for landing goods and passengers through a heavy surf, and for other purposes where buoyancy is chiefly wanted. It is formed generally of two inflated seal skins, connected by a sort of platform on which the fisherman, passengers, or goods are placed.

Balsam, an aromatic, resinous substance, flowing spontaneously or by incision from certain plants. A great variety of substances

Baltimore

pass under this name. But in chemistry the term is confined to such vegetable juices as consist of resins mixed with volatile oils, and yield the volatile oil on distillation. The resins are produced from the oils by oxidation. A balsam is thus intermediate between a volatile oil and a resin. It is soluble in alcohol and ether, and capable of yielding benzoic acid. The balsams are either liquid or more or less solid; as, for example, the balm of Gilead, and the balsams of Copiapo, Peru, and Tolu. Benzoin, dragon's-blood, and storax are not true balsams, though sometimes called so. The balsams are used in perfumery, medicine, and the arts.

Balsam Fir, the balm of Gilead fir.

Balta, a Russian town, government of Podolia, 115 mi. n.n.w. of Odessa. Pop. 32,558.

Baltic, Battle of the, the defeat of the Danish fleet at Copenhagen by Sir Hyde Parker and Nelson in 1801.

Baltic Provinces, a term commonly given to the Russian governments of Courland, Livonia, and Esthonia. Area 201,526 sq. mi.; pop. 6,450,835.

Baltic Sea, an inland sea or large gulf connected with the North Sea, washing the coasts of Denmark, Germany, Russia, and Sweden. Area 171,743 sq. mi. A chain of islands separates the southern part from the northern, or Gulf of Bothnia. In the northeast the Gulf of Finland stretches far into Russia, and separates Finland from Esthonia; the Gulf of Riga washes the shores of the three Russian governments of Courland, Livonia, and Esthonia; while the Gulf of Danzig is an inlet on the Prussian coast. The water of the Baltic is colder and clearer than that of the ocean; it contains a smaller proportion of salt, and the ice obstructs the navigation three or four months in the year. More than 250 rivers run into the Baltic, which has a large trade, and numbers among its more important harbors the cities of Copenhagen, Kiel, Danzig, Memel, Riga, Cronstadt, and Stockholm. The Sleswig-Holstein Canal, near Kiel, forms a method of access to the North Sea. The Sound, the Great and the Little Belt, lead from the Kattegat into the Baltic.

Bal'timore, Baltimore co., Md., on the n. side of the Patapsco, 14 mi. above Chesapeake Bay. Baltimore takes its name from Lord Baltimore, the founder of Maryland; it was first laid out as a town in 1729, and was erected into a city in 1797. It is well built, chiefly of brick, and is known as the "monumental city," from the public monuments which adorn it, the principal being the Washington Monument. Among its buildings are the city hall, built in Renaissance style, of white marble with a tower and dome rising 240 feet; the Peabody Institute, containing a library, art gallery, etc.; the Maryland Institute; the custom-house; the post-office; the U. S. court-house and jail, the Johns Hopkins Hospital, the Roman Catholic cathedral, etc. The chief educational institution, now one of the most important in the States, is the Johns Hopkins University, endowed with \$3,500,000

Baltimore

by its founder (whose name it bears). The University of Maryland is one of the oldest medical schools in the U. S., established in 1812. Industries: ship-building; manufactures of iron, wool, cotton, pottery, etc.; sugar-refining, distilling, tanning, the making of agricultural implements, canning oysters, and fruits, etc. As a flour market Baltimore is an important center; and it does an immense trade in exporting tobacco and other products. The harbor is very extensive, and has been much improved. In February, 1904, a great fire swept over the city, destroying more than seventy-five city blocks in the business district. The material loss was about \$80,000,000.

Baltimore, GEORGE CALVERT, LORD (1580-1632), b. in Yorkshire. He was for some time secretary of state to James I, but this post he resigned in 1624 in consequence of having become a Roman Catholic. Notwithstanding this he retained the confidence of the king, who in 1625 raised him to the Irish peerage, his title being from Baltimore, a fishing village of Cork. He had previously obtained a grant of land in Newfoundland, but as this colony was much exposed to the attacks of the French he left it, and obtained another patent for Maryland. He died before the charter was completed, and it was granted to his son Cecil.

Baltimore Bird (or oriole), an American bird, nearly allied to the starlings. It is a mi-



Baltimore Oriole.

gratory bird, and is known also by the names of "golden robin," "hang-bird," and "fire-bird." It is about 7 inches long; the head and upper parts are black; the under parts of a brilliant orange hue. It builds a pouch-like nest, very skillfully constructed of threads deftly interwoven, suspended from a forked branch and shaded by overhanging leaves. It feeds on insects, caterpillars, beetles, etc. Its song is a clear, mellow whistle.

Baluchistan (ba-lö'chi-stän), a country in Asia, consists of the districts of Quetta and Bolan. Area 160,000 sq. mi.; pop. est. at 400,000. The general surface of the country is

Bamboo

rugged and mountainous, with some extensive intervals of barren, sandy deserts, and there is a general deficiency of water. The country is almost entirely occupied by pastoral tribes under semi-independent sirdars or chiefs. The Khan of Khelat is nominal ruler of the whole land, and in 1877 concluded a treaty with Britain which placed the whole country at the disposal of the British government for all military and strategical purposes. Khelat is the capital, and Quetta, a town in the northeast, is the principal city.

Balzac (bäl-zák), **HONOREDE** (1799-1850), a celebrated French novelist, b. at Tours. Before completing his twenty-fourth year he had published a number of novels under various *noms de plume*, but the success attending all was very indifferent; and it was not till 1829, by the publication of *Le Dernier Chouan*, a tale of La Vendée, and the first novel to which Balzac appended his name, that the attention of the public was drawn to the extraordinary genius of the author. A still greater popularity attended his *Physiologie de Mariage*, a work full of piquant and caustic observations on human nature. He wrote a large number of novels, all marked by a singular knowledge of human nature and distinct delineation of character, but apt to be marred by exaggeration. A collected edition of his works under the title *La Comédie Humaine* was published in 45 volumes.

Bamba, a district of the Congo, w. coast of Africa, lying to the south of the river Ambriz. It is thickly populated, and is rich in gold, silver, copper, salt, etc.

Bambar'ra, a negro kingdom of Central Africa, on the Joliba (or Upper Niger), first visited by Mungo Park. The country is generally very fertile, producing wheat, rice, maize, yams, etc. The inhabitants belong to the Mandingo race, and are partly Mohammedans. Excellent cotton cloth is made. The capital is Sego. Pop. est. at 2,000,000.

Bam'berg, a town of Germany, Bavaria. It is the seat of a Catholic archbishop; the cathedral, founded in 1004, is one of the finest churches in Germany. The royal library contains 100,000 volumes and valuable MSS. Bamberg carries on a large trade; its industries are cotton spinning, tobacco manufacture, brewing, etc. Pop. 38,815.

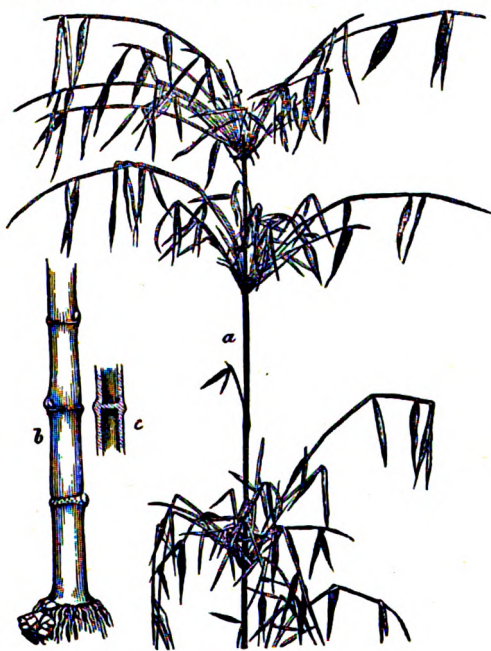
Bambino, the Italian word for *baby*, used in art to denote the figure of the infant Jesus. The *Santissimo Bambino* in the church of Ara Coeli, at Rome, is one of the most famous. It is beautifully carved from wood and richly decorated with precious stones. This image is held in great veneration and the Festival of the Bambino, which occurs at the Epiphany, is attended by great numbers of the peasants from the country about Rome.

Bambocciades (bam-boch-ädz') pictures, generally grotesque, of common, rustic, or low life, such as those of Peter Van Laar, a Dutch painter of the seventeenth century, who on account of his deformity was called *Bamboccio* (cripple). Teniers is the great master of this style.

Bamboo', the common name of the arborescent grasses belonging to the genus *Bambusa*.

Bambook

There are many species, belonging to the warmer parts of Asia, Africa, and America, and growing from a few feet to as much as 100 ft., requiring much moisture to thrive properly. The best-known species is common in tropical and sub-tropical regions. From the creeping underground rhizome, which is long, thick, and jointed, spring several round jointed stalks, which send out from their joints several shoots, the stalks also being armed at their joints with one or two sharp, rigid spines. The oval leaves, 8 or 9



Bamboo.
a.—upper portion of the stem with foliage.
b.—root stem. c.—section of stem.

inches long, are placed on short footstalks. The flowers grow in large panicles from the joints of the stalk. Some stems grow to 8 or 10 inches in diameter, and are so hard and durable as to be used for building purposes. The smaller stalks are used for walking sticks, flutes, etc.; and indeed the plant is used for innumerable purposes in the East Indies, China, and other Eastern countries. Cottages are almost wholly made of it; also, bridges, boxes, water pipes, ladders, fences, bows and arrows, spears, baskets, mats, paper, masts for boats, etc. The young shoots are pickled and eaten, or otherwise used as food. The seeds of some species are also eaten. The bamboo is imported into Europe and America as a paper material as well as for other purposes.

Bambook', a country in Western Africa. The natives are Mandingoes, mostly professed Mohammedans ruled by independent chieftains, most of whom acknowledge the supremacy of France. Gold and ivory are exchanged for European goods.

Banana

Bam'ian, a valley and pass of Afghanistan, the latter at an elevation of 8,496 feet, the only known pass over the Hindu Kush for artillery

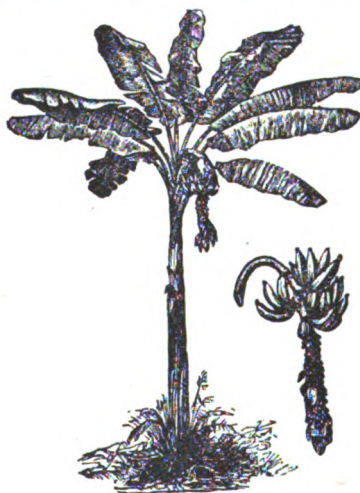


The Largest of the Figures at Bamian.

and heavy transport. The valley is one of the chief centers of Buddhist worship, and contains five remarkable colossal statues from two to three hundred feet high, carved in the rocks, and other ancient monuments.

Ban, anciently, a title given to the military chiefs who guarded the eastern marches of Hungary, now the title of the governor of Croatia and Slavonia, a division of the kingdom of Hungary. A province over which a ban is placed is called *banat*.

Bana'na, a plant of the genus *Musa*. It is originally indigenous to the East Indies, and



an herbaceous plant with an underground stem. The apparent stem, which is some-

Banana

times as high as 30 feet, is formed of the closely compacted sheaths of the leaves. The leaves are 6 to 10 feet long and 1 or more broad, with a strong midrib, from which the veins are given off at right angles; they are used for thatch, basket-making, etc., besides yielding a useful fiber. The spikes of the flowers grow nearly 4 feet long, in bunches, covered with purple-colored bracts. The fruit is 4 to 10 or 12 inches long, and 1 inch or more in diameter; it grows in large bunches, weighing often from 40 to 80 pounds. The pulp is soft and of a luscious taste; when ripe it is eaten raw or fried in slices. The banana is cultivated in tropical and sub-tropical countries, and is an important article of food. Manilla hemp is the product of a species of banana.

Bana'na, an African port, belonging to the Congo Free State, situated at the mouth of the river Congo.

Banana-bird, a pretty bird, a native of the West Indies and the warmer parts of America. It is a lively bird, easily domesticated, tawny and black in color, with white bars upon the wings.

Banbury (ban'be-ri), a town of England, in Oxford, long celebrated for its cheese, its cakes, and its ale. Pop. 12,768.

Banca, an island belonging to the Dutch East Indies, between Sumatra and Borneo, pop. 62,000, of which a considerable proportion are Chinese. It is celebrated for its excellent tin, of which the annual yield is above 4,000 tons; but it produces nothing else of any importance.

Bancroft, GEORGE (1800-1891), American historian, b. at Worcester, Mass. He entered Harvard 1813 and graduated 1817. Studied history and philology at Göttingen 1818. Received degree Ph. D. 1820. He attended the lectures of Hegel at Berlin, and while traveling on the continent formed the acquaintance of eminent scholars, among them Savigny, Schlosser, and Goethe. After returning to America he taught for a time, then entered politics, and was made collector of customs at Boston. While lecturing on German literature he continued his literary labors and published (1834-41) *The History of the Colonization of the United States*. Later this work was embodied in his larger history of *The United States of North America*. He was secretary of the navy under Polk (1845), and established the naval school at Annapolis. He was ambassador to England (1846). He published (1852), *History of the Revolution in North America*, from material collected while in England. His oration in honor of Abraham Lincoln, delivered 1866, is of historic value. He was minister to Russia (1867), and to the North German Confederation (1868). In 1871 he was accredited to the German empire. For many years he was an eminent contributor to *The North American Review*. While secretary of the navy he gave the order to take possession of California in case of war with Mexico. He was secretary of war one month, and gave the order to march

Banff

into Texas. His last public address was given at Washington, D. C., April 27, 1886.

Bancroft, HUBERT HOWE (1832 —), American historian, b. in Ohio, went to California in 1852, and engaged in the publishing business. He acquired a magnificent library of books relating to the history of the Pacific Coast, and in 1875 published in five volumes his work on *The Native Races of the Pacific States*. In 1882 he published the first volume of his *History of the Pacific States*. He has written on the Spanish missions of California and the vigilance committees.

Ban'croft, RICHARD (1544-1610), an English prelate, entered the church, and rose rapidly during the reign of Elizabeth till he obtained the see of London in 1597. James I made him Archbishop of Canterbury on the death of Whitgift.

Bandage, a surgical wrapper of some kind applied to a limb or other portion of the body

to keep parts in position, exert a pressure, or for other purpose. To be able to apply a bandage suitably in the case of an accident is a highly useful accomplishment, which through the teaching of ambulance surgery now so common, may be easily acquired. See *Surgery*.



Roller Bandage.

Banda Islands, a group belonging to Holland, Indian Archipelago. They are beautiful islands, of volcanic origin, yielding quantities of nutmeg. Goenong Api, or Fire Mountain, is a cone-shaped volcano which rises 2,320 feet above the sea. Pop. 6,700.

Bandan'na, a variety of silk handkerchief having a uniformly dyed ground, usually of bright red or blue, ornamented with white or yellow circular, lozenge-shaped, or other simple figures produced by discharging the ground color.

Ban'dicoot, the largest known species of rat, attaining the weight of 2 or 3 lbs., and the length, including the tail, of 24 to 30 in. It is a native of India, and is very abundant in Ceylon. Its flesh is said to be delicate and to resemble young pork, and is a favorite article of diet with the coolies. It is destructive to rice fields and gardens. The name is also given to a family of Australian marsupials. The most common species, the long-nosed bandicoot, measures about 1½ ft. from the tip of the snout to the origin of the tail, and in general appearance bears a considerable resemblance to a large, overgrown rat.

Baneberry, a European plant, local in England, with a spike of white flowers and black, poisonous berries. Two American species are considered remedies for rattlesnake bite.

Banff (bamf), county town of Banffshire, Scotland, a seaport on the Moray Firth at the

Bangalore

mouth of the Deveron. It is well built, carries on some ship-building, and has a rope and sail work, a brewery, etc., with a fishing and shipping trade. Pop. 7,598. The county has an area of 686 sq. mi. Little wheat is raised, the principal crops being barley, oats, turnips, and potatoes. Fishing is an important industry; as is also the distilling of whisky. Pop. 64,167.

Bangalore', a town of Hindustan, capital of Mysore, and giving its name to a considerable district in the east of Mysore state. The town stands on a healthy plateau 3,000 ft. above sea-level, has a total area of nearly 14 sq. mi., and is one of the pleasantest British stations in India. In the old town stands the fort, reconstructed by Hyder Ali in 1761, and taken by Lord Cornwallis in 1791. There are manufactures of silks, cotton cloth, carpets, gold and silver lace, etc. Pop. 180,366. The Bangalore district has an area of nearly 3,000 sq. mi., of which more than half represents cultivable land. Pop. 802,994.

Bangkok' (or Bankok), the capital of the kingdom of Siam. The inner city occupies an island surrounded with walls and bastions, and contains the palace of the king and other important buildings. A large portion of the population dwell in boats or wooden houses erected on bamboo rafts moored in the river, and forming a floating town. Houses in the European style are beginning to be erected, and among other advances recently made are the introduction of the telegraph and telephone, gas, fire-engines, and omnibuses. The exports consist chiefly of rice, sugar, silk, cotton, tobacco, pepper, sesame, ivory, aromatic wood, cabinet woods, tin, hides, etc.; and the imports consist chiefly of British cotton, woolen, and other goods. Pop. 350,000.

Ban'gor, a city of North Wales, in Caernarvonshire. Since the construction of the Menai Bridge, Bangor has risen into some importance as a popular resort; its principal trade is in the export of slates from the neighboring quarries. Pop. 12,261.

Ban'gor, a port of Penobscot co., Maine, on the w. side of Penobscot River, a flourishing and pleasantly situated town, and one of the largest lumber depots in the world. The river is navigable to the town for vessels of the largest size. Pop. 1900, 21,850.

Bangweo'lo, lake in South Africa, the southernmost of the great lake reservoirs of the Congo, discovered by Livingstone in 1868, an oval-shaped shallow sheet of water, said to be 150 mi. in length along its greater axis from e. to w., and about 75 mi. in width, but its exact limits are uncertain.

Ban'ian (or Ban'yan), Indian trader or merchant, one engaged in commerce generally, but more particularly one of the great traders of Western India, as in the seaports of Bombay, Kurrachee, etc., who carry on a large trade by means of caravans with the interior of Asia, and with Africa by vessels. They form a class of the Vaisya caste, wear a peculiar dress, and are strict in the observance of fasts and in abstaining from the use of flesh. Hence

Banks and Banking

—*Banian days*, days in which sailors in the navy had no flesh meat served out to them. Banian days are now abolished, but the term is still applied to days of poor fare.

Ban'jarmassin, a district and town in the s.e. of Borneo, under the government of the Dutch. Exports: pepper, benzoin, bezoar, rattans, dragon's-blood, birds'-nests, etc.; imports: rice, salt, sugar, opium, etc. Pop. of the district, 864,360.

Ban'jo, a stringed instrument, the favorite musical instrument of the negroes of the Southern states. It is six-stringed, has a body like a tambourine and neck like a guitar, and is played by stopping the strings with the fingers of the left hand and twitching or striking them with the fingers of the right. The upper or octave string, however, is never stopped.

Banks and Banking.—The definition of the word *bank*, etymologically considered, is a bench—its derivation is the Italian word *banco*—a bench upon which the Italian money dealers keep their money piled. This, at least, is the general acceptance of the term. Other authorities, and not without a show of reason, claim that the word is derived from the old German *banck*, which, however, has two meanings; one a pile and the other a bench. That the meaning of the word as applied to a heap or pile, is the origin of our modern term *bank*, is to a certain extent substantiated by the fact that among the early Italian bankers any aggregation of capital was termed a *Monte*. Thus to quote the words of Mr. Macleod:—

"At this time the Germans were masters of a great part of Italy, and the German word *banck*, meaning a heap, came to be used as synonymous with *Monte*, and was Italianized into *Banco*, and the public loans were called indifferently *Monti* or *Banchi*." The public pawn banks in France and Italy are still called *Monte*. This was also the interpretation given to the word during the colonial days of this country.

Professor Sumner says in his *History of Banking in the United States*: "The sense of *bank* would be best expressed by *batch*, because it was applied to the mass of bills provided for and loaned out at one time, under one act of legislation." And again, "The first bank in that Colony (Rhode Island) was for £30,000 issued in 1715 for ten years."

Banking, in its modern sense, was not unknown to the earlier civilizations. Excavations at Babylon have revealed tablets showing the records of a bank account as early as 600 B.C. Rome, however, can be called the birth-place of banking. Cicero in his letters speaks of bills of exchange, and a number of banking terms then in vogue are used in the same sense at the present day. The principles underlying our present system have come down to us from the days of imperial Rome without change or modification. The Crusades of the Middle Ages were mainly instrumental in the development of banking in the earlier Italian Republics, and the demands of the times gave birth to the banking firms of the Medici and the

Banks in the U. S.

Pitti; the princely houses which at the same time presided over the destinies of state and controlled the marts of trade. The Bank of Venice, the Bank of St. George at Genoa, and the Bank of Amsterdam are the oldest banks in history, and while not strictly banks in the modern acceptation of the term, they were the forerunners of the magnificent institutions which now control the destinies of commerce. The Bank of England owes its origin to the exigencies of the time when it was founded, and its present strength and powers of usefulness are the results of a development toward which all classes, from the philosopher to the mechanic, have contributed a share.

The modern understanding of the functions of a bank is that it is an institution used for the purpose of distributing capital where it can be made productive. Its sole purpose is supposed to be that of facilitating commerce between individuals, communities, and nations. The following description of the workings of the Bank of England, and the joint stock banks of London, may be aptly taken as an illustration: "Money is collected in the country districts by local banks, such of it as can be used is loaned at home, while the balance—and this comprises generally the larger portion of such funds—is remitted to London to be held there as a reserve. Money is remitted by foreign countries for the purchase of commodities which have no other mart, or is attracted by a higher rate of interest. Thus a steady stream pours in from all parts and accumulates in the one center until active employment for it is found; and thus has London developed into the money market, not only of England, but of the world. The money from agricultural districts is loaned in the industrial regions. The money from France is loaned in South America, but London acts as the broker."

A similar process is at work in every large city where commercial relations are established. The wants of the individual, the business man, the corporation, the municipality, are all supplied by the local banking institutions collecting the money from many sources, primarily for the purposes of safe-keeping, and then as remuneration for its services, exacting a charge from borrowers commensurate with the value of the money and the extent of the risk incurred in loaning it.

Each country has a different system of banking. In the continental countries of Europe the center institution is generally a state bank with the privilege of issuing notes, and is surrounded by minor institutions which follow out distinct lines of business. In England we find the Bank of England and that wonderful group of joint stock banks showing deposits for an aggregate sum of \$2,800,000,000, while in the U. S. the national banking system, and the so-called state banks—i. e., banks deriving their charter from the respective states in which they are located—hold their sway.

JOHN E. GARDIN.

Banks in the U. S.—The first U. S. Bank was chartered in 1791. Previous to this time

Banks, Savings

there were three banks in the U. S. with an aggregate capital of \$2,000,000; the Bank of North America, chartered by Congress in 1780, and by Pennsylvania in the following year, with a capital of \$400,000; the Bank of Massachusetts in 1784; the Bank of New York in the same year. The U. S. Bank charter was limited to 1811, or twenty years from date of issue. Its capital was \$10,000,000, and the government retained the right to subscribe one fifth; \$5,700,000 to be held in Philadelphia and the remainder to be distributed among the branches. Headquarters were to be at Philadelphia, and the bank had twenty directors. All the stock was sold in 1802 at a premium. The bank was not rechartered; it was opposed as unconstitutional, as in the hands of foreigners, and injurious to local banks. Owing largely to this failure to re-charter, specie payments were suspended in 1814. In 1816 President Madison approved the bill chartering a U. S. Bank with a capital of \$35,000,000, of which the government subscribed \$7,000,000, and citizens the rest. This charter was limited to twenty years. The government funds were kept on deposit at this bank. President Jackson opposed the bank, and when the bank asked for a renewal of its charter in 1831, the act was passed by Congress, but was vetoed by the president. Pennsylvania rechartered the bank thirteen days before the original charter expired. It was known as the U. S. Bank of Pennsylvania. It suspended specie payment in 1837 and again in 1839, and a final suspension was made in 1840-41. It proved a total loss to the shareholders. New York adopted a banking system in 1838, and Ohio adopted the safety fund system. The first clearing house in America was established in 1853 in New York. At the beginning of the Civil War in 1861, there were 1,600 state banks having a gross aggregate capital of \$429,000,000, with 10,000 different kinds of notes in circulation. A national bank system was devised by Secretary Chase, and in 1863 Congress made paper currency and the banking laws of the country uniform. State banks were forced to surrender their charters and become national banks. In 1870 the circulation of the national banks was limited to \$354,000,000, secured by deposit of government bonds with the treasurer. This limitation has since been repealed; 2,572 of the state banks still exist having a total capital of \$208,564,841. Following is the number of national banks in the twenty principal cities of the Union: New York, 47; Chicago, 19; St. Louis, 8; Boston, 56; Albany, 6; Brooklyn, 5; Philadelphia, 45; Pittsburg, 26; Baltimore, 19; Washington, 11; New Orleans, 10; Louisville, 10; Cincinnati, 13; Cleveland, 10; Detroit, 8; St. Paul, 6; Minneapolis, 6; Kansas City, 10; Omaha, 9; and San Francisco, 2. These banks are obliged to keep a reserve of 25 per cent. of deposits. The total amount of resources of all the national banks in operation in 1885 was \$2,432,900,000; in 1900 \$4,944,165,623; total specie, coin and coin certificates held by national banks in July, 1900, was \$356,013,709.08.

Banks, Savings. See *Savings Banks*.

Bankiva Fowl

Banki'va Fowl, a fowl living wild in Northern India, Java, Sumatra, etc., believed to be the original of our common domestic fowls.

Bankrupt, a person whom the law does or may take cognizance of as unable to pay his debts. Properly it is of narrower signification than *insolvent*, an insolvent person simply being unable to pay all his debts. In England up till 1861 the term bankrupt was limited to an insolvent trader, and such traders were on a different footing from other insolvent persons, the latter not getting the same legal relief from their debts. In all civilized communities laws have been passed regarding bankruptcy. At present bankruptcy in England is regulated by the Bankruptcy Act of 1883, which has as its essential feature the intervention of the Board of Trade at all stages of the bankruptcy, with the object of obtaining full official supervision and control. In America Congress has the power of legislating upon bankruptcy and upon two occasions has done so. A federal statute in force suspends all state laws on bankruptcy. There is now no federal statute in operation, but the Torrey bankruptcy bill is before Congress. Several of the states have bankruptcy laws in operation, the northern or commercial states favoring such enactments and the southern objecting to this kind of legislation.

Banks, JOSEPH (1743-1820), a noted British naturalist. He was chosen a member of the Royal Society in 1766, and soon after went to Newfoundland and Hudson's Bay to collect plants. In 1768, with Dr. Solander, a Swedish gentleman, pupil of Linnæus, and then assistant librarian at the British Museum, he accompanied Cook's expedition as naturalist. In 1772 he visited Iceland along with Dr. Solander, and during this voyage the Hebrides were examined, and the columnar formation of the rocks of Staffa first made known to naturalists. In 1777 Banks was chosen president of the Royal Society, in 1781 was made a baronet, and in 1795 received the order of the Bath. He wrote only essays, papers for learned societies, and short treatises. He bequeathed his collections to the British Museum.

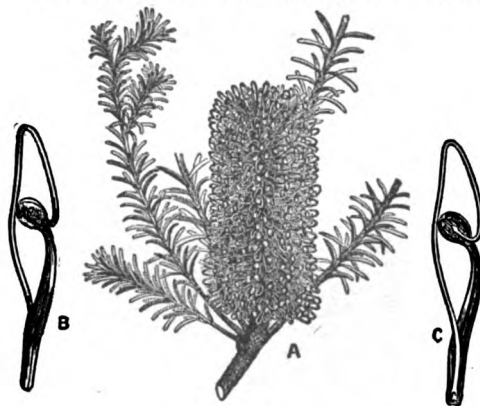
Banks, THOMAS (1735-1805), an English sculptor. He studied sculpture in the Royal Academy and in Italy. On leaving Italy he spent two unsatisfactory years in Russia, and then returned to England, where he was soon after made an academican. Among his works was a colossal statue of *Achilles Mourning the Loss of Briseis* in the hall of the British Institution, and the monument of Sir Eyre Coote in Westminster Abbey.

Banks, NATHANIEL PRENTISS (1816-94), an American soldier, b. at Waltham, Mass. Learned the trade of a machinist, and became first a lecturer, then a local newspaper editor, studied law, then representative in the legislature, governor of Massachusetts, speaker in U. S. Congress 1856-57, and general of volunteers in 1862. His first military effort was made at the battle of Winchester, where he was attacked by the forces of "Stonewall"

Bannatyne Club

Jackson. Later General Banks was placed in command of the defenses of Washington, while preparations were being secretly made to send a strong expedition by sea to New Orleans. He was assigned to command this expedition, which sailed from New York in November and December. On reaching New Orleans he succeeded Gen. B. F. Butler in command. In July the news of the surrender of Vicksburg was received, and on the ninth of that month the garrison of Port Hudson, 6,000 in number, capitulated to the investing forces of General Banks. In the early part of the following year the army of General Banks was joined by 10,000 men, under Gen. A. J. Smith. The united forces advanced as far as Sabine Cross Roads. Here the Federals were met by the Confederate forces under Gen. Richard Taylor, and driven back to Pleasant Hill; but on the following day, when the Confederates saw fit to renew the attack, they were repelled. The Federal army then retired to the Mississippi River. In May, 1864, General Banks was relieved of his command, resigned his commission, and returned to his native state, where he was biennially elected to Congress by his former constituents until 1877, failing only in 1872. For a long time General Banks was chairman of the committee on foreign relations. He afterward served as U. S. marshal for Massachusetts, and was again elected to Congress in 1888 from the fifth Massachusetts district as a Republican.

Banksia, a North American species of pine



Banksia.

A.—shoot; B.—single flower enlarged; C.—in section. tree growing around Hudson's Bay, about 25 ft. high.

Bann, Upper and Lower, two rivers in the n. of Ireland, the former rising in the mountains of Mourne, county Down, and after flowing 38 mi. in a n. direction, falling into Lough Neagh, the latter being the outlet of Lough Neagh, and falling into the Atlantic Ocean 4 mi. below Coleraine, after a course of nearly 40 mi.

Ban'natyne Club, a literary society instituted in Edinburgh (1823) by Sir Walter Scott

Bannockburn

(its first president), David Laing (secretary till its dissolution in 1865), Archibald Constable, and Thomas Thomson. It started with thirty-one members, subsequently extended to 100, having as its object the printing of rare works on Scotch history, literature, geography, etc. It derived its name from George Bannatyne (1545-1609), the collector of the famous MSS. of early Scottish poetry.

Bannockburn, a village of Scotland, in Stirlingshire, 2 mi. s.e. Stirling, famous for the decisive battle in which King Robert Bruce of Scotland defeated Edward II of England, on June 24, 1314. It has manufactures of woollens, such as tartans, carpets, etc. Pop. 3,374.

Bannu, a district in the Punjab, Hindustan, on the northwestern frontier. Area 3,868 sq. mi.; pop. 332,577, of whom nearly half are Afghans.

Banquette (bang-ket'), in fortification, the elevation of earth behind a parapet, on which the garrison or defenders may stand. The height of the parapet above the banquette is usually about 4 feet 6 inches; the breadth of the banquette from 2½ or 3 feet to 4 or 6 feet according to the number of ranks to occupy it. It is frequently made double; that is, a second is made still lower.

Banshee (Benshi'), a weird hag, believed in Ireland and some parts of Scotland to attach herself to a particular house, and to appear or make her presence known by wailing before the death of one of the family.

Ban'tam, a residency occupying the whole of the w. end of the island of Java. It formed an independent kingdom, governed by its own sultan, till 1683, and the Dutch exercised suzerainty with brief intermission until its formal incorporation by them at the beginning of the present century. It produces rice, coffee, sugar, cinnamon, etc. Serang is its capital. The town Bantam was the first Dutch settlement in Java (1595), and for some time their principal mart, though now greatly decayed.

Ban'tam Fowl, a small but spirited breed of domestic fowl, first brought from the East Indies, supposed to derive its name from Bantam in Java. Most of the sub-varieties have feathered legs; but these are not to be preferred. In point of color the black and nankeen varieties take the palm. A well-bred bantam does not weigh more than a pound.

Ban'try, a small seaport town near the head of Bantry Bay, county Cork, Ireland. The bay, one of three large inlets at the s. w. extremity of Ireland, affords an unsurpassed anchorage.

Bantu (bän-tö'), the ethnological name of a group of African races, including the Kaffirs, Zulus, Bechuanas, the tribes of the Loango, Congo, etc., but not the Hottentots.

Banx'ring, a quadruped belonging to the Insectivora, or insect-eaters, inhabiting the Indian Archipelago, bearing some resemblance externally to a squirrel, but having a long, pointed snout. They live among trees, which they ascend with great agility.

Ban'yan (or Ban'ian), a tree of India, of

Baobab

the fig genus. The most peculiar feature of this tree is its method of throwing out from the horizontal branches, supports which take root as soon as they reach the ground, enlarge into trunks, and extending branches in their turn, soon cover a prodigious extent of ground. A celebrated banyan-tree has been known to shelter 7,000 men beneath its shade. The wood is soft and porous, and from its white, glutinous juice bird-lime is sometimes prepared. Both juice and bark are regarded by the Hindus as valuable medicines. One of the largest banyan trees known to exist has been discovered on one of the Howe Islands, 300 miles from Port Macquarie, in Australia,



Banyan Tree.

and the space it covers is nearly seven acres. Five acres is the area covered by a banyan-tree growing on the banks of the river Narbudda, in the Province of Guzerat, India. It is distinguished by the name of Cubbeer Burr, which was given it in honor of a famous saint. High floods have at various times swept away parts of this extraordinary tree, but what remains is nearly 2,000 ft. in circumference, measured round the principal stems; the overhanging branches not yet struck down cover a much larger space. The large trunks of this tree amount to 350, and the smaller ones exceed 3,000, every one of which is constantly sending forth branches and hanging roots to form other trunks. It is said that 7,000 persons find ample room to repose under its shade.

Ba'obab (or Monkey-bread Tree), a tree, the only known species of its genus, which was named after the naturalist Adanson. It is one of the largest of trees, its trunk sometimes attaining a diameter of 30 feet; and as the profusion of leaves and drooping boughs sometimes almost hides the stem, the whole forms a hemispherical mass of verdure 140 to 150 feet in diameter and 60 to 70 feet high. It is a native of Western Africa, and is found also in Abyssinia; it is cultivated in many of the warmer parts of the world. The roots are of extraordinary length, a tree 77 feet in girth having a tap-root 110 feet in length. The leaves are deep green, divided into five une-

Baptism

qual parts lanceolate in shape, and radiating from a common center. The flowers resemble the white poppy, having snowy petals and violet-colored stamens; and the fruit, which is large and of an oblong shape, is said to taste like gingerbread, with a pleasant acid flavor. The wood is pale-colored, light, and soft. The tree is liable to be attacked by a fungus which, vegetating in the woody part, renders it soft and pithlike. By the negroes of the



Baobab Tree.

West Coast these trunks are hollowed into chambers, and dead bodies are suspended in them. There they become perfectly dry and well preserved, without further preparation or embalming. The pulverized leaves constitute *lalo*, which the natives mix with their daily food to diminish excessive perspiration, and which is even used by Europeans in fevers and diarrheas. The expressed juice of the fruit is used as a cooling drink in putrid fevers, and also as a seasoning for various foods.

Baptism, a rite which is generally thought to have been usual with the Jews even before Christ, being administered to proselytes. From this baptism, however, that of St. John the Baptist differed, because he baptized Jews also as a symbol of the necessity of perfect purification from sin. Christ himself never baptized, but directed his disciples to administer this rite to converts (Matt. 28 : 19); and baptism, therefore, became a religious ceremony among Christians, taking rank as a sacrament with all sects which acknowledge sacraments. In the primitive church the person to be baptized was dipped in a river or in a vessel, with the words which Christ had ordered, generally adopting a new name to further express the change. Sprinkling, or, as it was termed, *clinic* baptism, was used only in the case of the sick who could not leave their beds. The Greek church and Eastern schismatics retained the custom of immer-

Barbara

sion; but the Western church adopted or allowed the mode of baptism by pouring or sprinkling, since continued by most Protestants. This practise can be traced back certainly to the third century, before which its existence is disputed. Since the Reformation there have been various Protestant sects called Baptists, holding that baptism should be administered only by immersion, and to those who can make a personal profession of faith.

Bap'tists, a Protestant sect, distinguished by their opinions respecting the mode and subjects of baptism. With regard to the mode, they maintain the necessity of immersion.

Baptist Young People's Union. The Baptist Young People's Union of America was organized July 7, 1891, as a federation of all Baptist young people, without regard to name or organization, for the purpose of bringing all such persons together in a common interest and sympathy in work, seeking to develop Christian character, enlargement of Scriptural knowledge and the imparting of a wider missionary outlook. The association is represented by branch societies in nearly every state and territory. The headquarters are at 324 Dearborn street, Chicago.

Baraboo, co. seat of Sauk co., Wis., on the Baraboo river, 3 m. from Devil's Lake. Railroad: C. & N. W. Baraboo is the center of a fruit-growing district. Pop. 1900, 5,751.

Barb, a horse of the Barbary breed, introduced by the Moors into Spain, and of great speed, endurance, and docility.

Barba' does (or Barbados), the most eastern of the West Indies Islands, first mentioned in 1518, and occupied by the British in 1625. Area 166 sq. mi.; capital, Bridgetown; pop. 20,996. The island is more densely peopled than almost any spot in the world, the population being 182,306. The climate is very hot, though moderated by the constant trade-winds; and the island is subject to dreadful hurricanes. The black low-land soil gives great returns of sugar in favorable seasons. The chief exports, besides sugar, are molasses and rum; imports: rice, salt meat, corn, butter, flour, etc. Barbadoes has a considerable transit trade, being in some measure the central mart for all the Windward Islands. It is the headquarters of the British forces in the West Indies. There is a railway across the island, also tramways, telephones, etc. The island forms a distinct government under a governor, an executive and a legislative council, and a house of assembly.

Barbadoes Cherry, the pleasant, tart, fleshy fruit of a West Indian tree 15 ft. high.

Barbadoes Gooseberry, the fruit of a West Indian species of cactus.

Bar'bara, St., according to the legend belonged to Nicomedia, in Asia Minor, and was beheaded by her father for having turned Christian, he being immediately thereafter struck dead by lightning. She is invoked in storms, and is considered the patron saint of artillerists.

Barbarian

Barbarian, a name given by the Greeks and afterward by the Romans to every one who spoke an unintelligible language; and hence coming to connote the idea of *rude, illiterate, uncivilized*. This word, therefore, did not always convey the idea of something odious or savage; thus Plautus calls Nævius a barbarous poet, because he had not written in Greek; and Cicero terms illiterate persons without taste "barbarians."

Barbarossa, a surname given to Frederick I, of Germany.

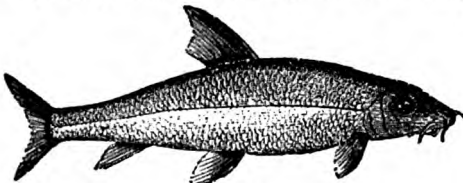
Barbarossa ("red-beard"), the name of two famous Turkish corsairs of the sixteenth century, who ravaged the shores of the Mediterranean, and established themselves in Algiers. The elder of the brothers, Aruch (or Horuk), was killed in 1518; the younger and more notorious, Hayraddin, who captured Tunis, died in 1546.

Bar'bary, a general name for the most northerly portion of Africa, comprising Morocco, Fez, Algeria, Tunis, and Tripoli (including Barca and Fezzan). The principal races are: the Berbers, the original inhabitants, from whom the country takes its name; the Arabs who conquered an extensive portion of it during the times of the caliphs; the Bedouins, Jews, Turks, and the French colonists of Algeria, etc. The country which was prosperous under the Carthaginians, was, next to Egypt, the richest of the Roman provinces, and the Italian states enriched themselves by their intercourse with it. In the fifteenth century, however, it became infested with adventurers who made the name of Barbary corsair a terror to commerce, a condition of things finally removed by the French occupation of Algeria.

Barbary Ape, a species of ape, or tailless monkey, with greenish-brown hair, of the size of a large cat, remarkable for docility, also called the *magot*. It is common in Barbary and other parts of Africa, and some used to live formerly on Gibraltar Rock, being the only European monkey, though probably not indigenous. It has been the "showman's ape" from time immemorial.

Bar'becue, a word of West Indian origin, meaning a hog, or other large animal, roasted whole. In the southern states the word is used to signify any jollification or especially a political festivity.

Barbel, a genus of fresh-water fishes of the carp family, distinguished by the four fleshy



Barbel.

filaments growing from the lips, two at the nose and one at each corner of the mouth, forming the kind of beard to which the genus owes its name. The barbel is common in Eu-

Barberry

ropean rivers, and runs in weight from 9 to 20 lbs. It gives good sport to the angler, but its flesh is very coarse.

Barber, one whose occupation is to shave or trim the beard, or cut and dress hair. The practise of surgery was formerly a part of the craft, and by an act of Henry VIII, the Company of Barbers was incorporated with the Company of Surgeons—the company being then known as the Barber-surgeons—with the limitation, however, that the surgeons were not to shave or practise "barbery," and the barbers were to perform no higher surgical operation than blood-letting and tooth-drawing. This continued till the time of George II. The signs of the old profession—the pole which the patient grasped, its spiral decoration in imitation of the bandage, and the basin to catch the blood—are still sometimes retained. The barbers' shops, always notorious for gossip, were in some measure the news-centers of classic and mediæval times.

Barberini (bâr-be-rē'nē), a celebrated Florentine family, which, since the pontificate of Maffeo Barberini (Urban VIII, 1623 to 1644), has occupied a distinguished place among the nobility of Rome. During his reign he seemed chiefly intent on the aggrandizement of his three nephews, of whom two were appointed cardinals, and the third Prince of Palestrina.

Bar'berry, a genus of shrubs, the common barberry having bunches of small, beautiful red berries, somewhat oval; serrated and



Barberry. a.—Flowering branch; b.—Fruit.

pointed leaves; thorns, three together, upon the branches; and hanging clusters of yellow flowers. The berries nearly approach the tamarind in respect of acidity, and when boiled with sugar make an agreeable preserve, rob, or jelly. They are also used as a dry sweetmeat, and in sugarplums or comfits; are pickled with vinegar, and are used for the garnishing of dishes. The bark is said to have medicinal properties, and the inner bark

Barborton

and roots with alum yield a fine yellow dye. The shrub was originally a native of eastern countries, but is now generally diffused in Europe, as also in North America. Numerous other species belong to America and Asia.

Bar'berton, the chief mining center of De Kaap gold fields, Transvaal, about 80 mi. from Lydenburg, and 150 to 160 mi. from Delagoa Bay. Pop. about 4,000.

Bar'bets, a family of climbing birds with a thick conical beak, having tufts of bristles at its base. Their wings are short and their flight somewhat heavy. They have been divided into three subgenera: The *barbicans*, inhabiting India and Africa, and feeding chiefly on fruit; the *barbets* proper, found in America and Africa, and nearly related to the woodpeckers; and the *puff-birds*, inhabiting America, and feeding on insects.

Barbette (bâr-bet'), an elevation of earth behind the breastwork of a fortification, from which the artillery may be fired over the parapet instead of through an embrasure. A barbette carriage is a carriage which elevates a gun sufficiently high to permit its being fired over the parapet.

Barbuda (bâr-bô'da), one of the West Indies, annexed by Britain in 1628; about 15 mi. long and 8 wide; lying n. of Antigua; pop. 800. It is flat, fertile, and healthy. Corn, cotton, pepper, and tobacco are the principal produce, but the island is only partially cleared for cultivation. It is a dependency of Antigua.

Bar'ca, a division of North Africa, between the Gulf of Sidra and Egypt, a vilayet of the Turkish Empire, capital Bengazi. It formed a portion of the ancient Cyrenaica, and from the time of the Ptolemies was known as Pentapolis from its five Greek cities. The exports are grain and cattle, with ostrich feathers and ivory from the interior. Next to Bengazi the seaport of Derna is the chief town. The pop. probably does not exceed 300,000.

Barcarolle (-rol'), a species of song sung by the barcaruoli, or gondoliers of Venice, and hence applied to a song or melody composed in imitation.

Barcelona (bar-thel-ô'nâ), one of the largest cities of Spain, chief town of the province of Barcelona, and formerly capital of the kingdom of Catalonia; situated on the northern portion of the Spanish Mediterranean coast. It is divided into the upper and lower town; the former modern, regular, stone-built, the latter old, irregular, brick-built. The principal manufactures are cottons, silks, woollens, machinery, paper, glass, chemicals, stone-ware, soap; exports: manufactured goods, wine and brandy, fruit, oil, etc.; imports: coal, textile fabrics, machinery, cotton, fish, hides, silks, timber, etc. The city contains a university, several public libraries, a museum, a large arsenal, cannon foundry, etc. Barcelona was, until the twelfth century, governed by its own count, but was afterward united with Arragon. In 1640, with the rest of Catalonia, it placed itself under the French crown; in 1652 it submitted again to the Spanish government; in 1697 it was taken by the

Bareilly

French, but was restored to Spain at the Peace of Ryswick. Pop. 272,481. The province has an area of 2,968 sq. mi.; pop. 902,970. It is generally mountainous, but well cultivated, and among the most thickly peopled in Spain.

Barcelona, a town of Venezuela, near the mouth of the Neveri River, founded in 1671. Pop. 12,785.

Barclay, ROBERT (1648-1690), the celebrated apologist of the Quakers, b. at Gordons-town, Moray, Scotland, and educated at Paris, where he became a Roman Catholic. Later he became a Quaker. He published writings to rectify public sentiment in regard to the Quakers. In his travels with William Penn and George Fox through England, Holland, and Germany, to spread the opinions of the Quakers, he was received everywhere with the highest respect.

Bar-cochba (bâr-ko'h'bâ), SIMON, a Jewish impostor, who pretended to be the Messiah, raised a revolt, and made himself master of Jerusalem about 132 A. D., and of about fifty fortified places. Bar-cochba perished in the assault of Jerusalem by the Romans three years after, about 135.

Bard, one of an order among the ancient Celtic tribes, whose occupation was to compose and sing verses in honor of the heroic achievements of princes and brave men, generally to the accompaniment of the harp. Their verses also frequently embodied religious or ethical precepts, genealogies, laws, etc. Their existence and function was known to the Romans two centuries B. C.; but of the Gallic bards only the tradition of their popularity survives. The first Welsh bards of whom anything is extant are Taliesin, Aneurin, and Llywarch, of the sixth century. Edward I is said to have hanged all the Welsh bards as promoters of sedition. The Cambrian Society was formed in 1818 for the preservation of the remains of the ancient literature. The revived Eisteddfodan, or bardic festivals, have been so far exceedingly popular.

Bardwan' (or Burdwan'), a division of Bengal, upon the Hugli, comprising the six districts of Bardwan, Hugli, Howrah, Midnapur, Bankura, and Birbhum. Area 13,855 sq. mi.; pop. 7,393,954. The district Bardwan has an area of 2,697 sq. mi., and a pop. of 1,391,823. Apart from its products (rice, grain, hemp, cotton, indigo, etc.), it has a noted coal field of about 500 sq. mi. in area, with an annual output of about half a million tons. The town of Bardwan has a fine palace of the Maharajah and a pop. of 34,080.

Barège (ba-râzh'), a light, open tissue of silk and worsted, or cotton and worsted, for women's dresses, originally manufactured near Baréges.

Bareges (ba-râgh), a watering-place, s. of France, dep. Hautes-Pyrénées, about 4,000 ft. above the sea, celebrated for its thermal springs which are frequented for rheumatism, scrofula, etc. The place is hardly inhabited except in the bathing season, June to September.

Bareilly (ba-râ'li), a town of Hindustan in

Barham

the N. W. Provinces, capital of a district of same name. On the outbreak of the Indian mutiny the native garrison took possession of the place, but it was retaken by Lord Clyde in May, 1858. Pop. 121,039. The district has an area of 2,982 sq. mi.; pop. 1,040,691.

Barham, RICHARD HARRIS (1788-1845), the author of the *Ingoldsby Legends*. In 1802 by a coach accident his right arm was crippled for life. He was ordained in 1813, and in 1821 was appointed a minor canon of St. Paul's. He published several novels, and with the commencement of *Bentley's Miscellany* in 1837, he began his inimitable burlesque metrical tales under the *nom de plume* of Thomas Ingoldsby, which at once became popular from their droll humor, fine irony, and varied and whimsical rhymes.

Bari (bār'ē), a seaport, South Italy, on a small promontory of the Adriatic, capital of the province Terra di Bari. It was a place of importance as early as the third century B. C., and has been thrice destroyed and rebuilt. The present town, though poorly built for the most part, has a large Norman castle, a fine cathedral and priory, etc. It manufactures cotton and linen goods, hats, soap, glass, and liquors; has a trade in wine, grain, almonds, oil, etc., and is now an important seaport. Pop. 63,366. The province has an area of 2,280 sq. mi., and is fertile in fruit, wine, oil, etc.; pop. 723,730.

Bari, a negro people of Africa, dwelling on both sides of the White Nile, and having Gondokoro as their chief town. They practise agriculture and cattle-rearing. Their country was conquered by Sir Samuel Baker for Egypt.

Baril'la, the commercial name for the impure carbonate and sulphate of soda imported from Spain and the Levant. It is the Spanish name of a plant, from the ashes of which and from those of others of the same genus the crude alkali is obtained. On the shores of the Mediterranean the seeds of the plants from which it is obtained are regularly sown near the sea, and these, when at a sufficient state of maturity, are pulled up, dried, and burned in bundles in ovens or in trenches. The ashes, while hot, are continually stirred with long poles, and the saline matter they contain forms, when cold, a solid mass, almost as hard as stone. To obtain the carbonate of soda it is only requisite to lixiviate the barilla in boiling water, and evaporate the solution. British barilla or kelp is a still more impure alkali obtained from burning seaweeds. Soda is now obtained for the most part from common salt.

Ba'ring Brothers, the name of a noted British banking firm, the founders of which were Francis and John B., sons of a German named John B., who settled in England in the first half of the eighteenth century. The now celebrated house was established in 1770. Francis B., who was a strong adherent of William Pitt, was made a baronet by that minister in 1793. He was succeeded by his eldest son, Sir Thomas B. Sir Francis's second son, Alexander, was in 1353 created Lord Ash-

Bark

burton. Sir Thomas d. in 1848, and was succeeded by his son, Sir Francis Thornhill B., who was M. P. for Portsmouth from 1826 to 1865. Under successive Whig governments he held the offices of lord of the treasury, secretary to the treasury, chancellor of the exchequer, and first lord of the admiralty. In January, 1866, he was created Baron Northbrook. He d. in the following September. He was succeeded by his son, the present Lord Northbrook. Thomas B., M. P. (b. 1800), uncle of the present lord, devoted himself to commerce, and was universally known for many years as the leading partner in the great mercantile firm of B. Brothers. He d. Nov. 18, 1873. Edward Charles B., the then head of the firm, was, in 1885, raised to the peerage as Baron Revelstoke. In 1890, very large amounts being invested in South American securities which had become depreciated, and were not readily realizable, the firm became seriously embarrassed, but by the assistance of a guarantee by the Bank of England and the other principal banks, they were enabled to surmount their difficulties, and thus prevent a commercial catastrophe, the far-reaching and ruinous consequences of which no one could estimate. A reconstruction of the firm then took place.

Baring-Gould (bā-ring-gold'), SABINE, English clergyman and author, b. at Exeter 1834. Educated at Cambridge, he has held several livings in the English church, being now rector of Lew Trenchard, Devon. Among his works are: *Iceland, its Scenes and Sagas*; *Curious Myths of the Middle Ages*; *The Origin and Development of Religious Belief*; *Lives of the Saints*; *Village Sermons*; besides the novels: *Mehalah*. *John Herring*, *Richard Cable*, *the Gaverocks*, etc.; and short stories or novelettes.

Ba'rium, the metallic basis of baryta, which is an oxide of barium. It is only found in compounds, such as the common sulphate and carbonate, and was isolated by Davy for the first time in 1808. It is a yellow, malleable metal, which readily oxidizes, decomposes water, and fuses at a low temperature. Its nitrate and chlorate are used in pyrotechny.

Bark, the exterior covering of the stems of exogenous plants. It is composed of cellular and vascular tissue, is separable from the wood, and is often regarded as consisting of four layers: 1, *epidermis* or *cuticle*, which, however, is scarcely regarded as a part of the true bark; 2, the *epiphloeum* or outer cellular layer of the true bark or cortex; 3, the *mesophloeum* or middle layer, also cellular; 4, an inner vascular layer, the *liber* or *endophloeum*, commonly called *bast*. Endogenous plants have no true bark. Bark contains many valuable products, as gum, tannin, etc.; cork is a highly useful substance obtained from the *epiphloeum*; and the strength and flexibility of *bast* make it of considerable value. Bark used for tanning is obtained from oak, hemlock-spruce, species of *acacia* growing in Australia, etc. Angostura bark, Peruvian or cinchona, cinnamon, cascarilla, etc., are useful barks.

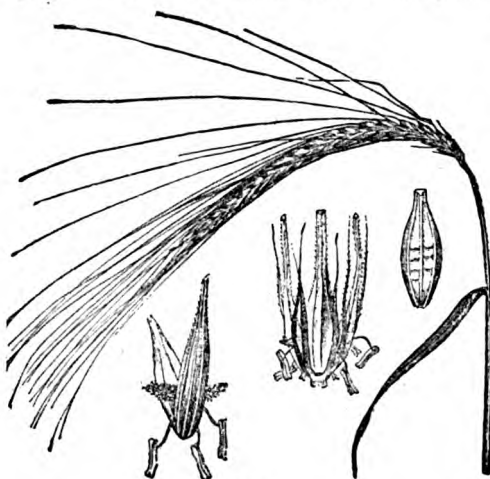
Bark

Bark, Peruvian, is the bark of various species of trees of the genus *Cinchona*, found in many parts of S. A. but more particularly in Peru, and having medicinal properties. It was formerly called *Jesuit's bark*, from its having been introduced into Europe by Jesuits. Its medicinal properties depend upon the presence of *quinine*, which is now extracted from the bark, imported, and prescribed in place of nauseous mouthfuls of bark.

Bar-le-duc (bâr-l-duk), a town of n. e. France, capital of dep. Meuse, with manufactures of cotton and woolen stuffs, leather, confectionery, etc. Pop. 18,761.

Barlet'ta, a seaport in South Italy, province of Bari, on the Adriatic, with a fine Gothic cathedral; it has a considerable export trade in grain, wine, almonds, etc. Pop. 34,775.

Bar'ley, the name of several cereal plants of the genus *Hordeum*, order *Gramineæ* (grasses), yielding a grain used as food and also for making malt, from which are prepared beer, porter, and whisky. Barley has been known and cultivated from remote antiquity, and beer was made from it among the



Barley.

Egyptians. The species principally cultivated are two-rowed barley; four-rowed barley; and six-rowed, of which the small variety is the sacred barley of the ancients. Some of these are called *bere* or *bigg*. In North America the extent of it as a crop is comparatively small, being in Canada, however, relatively greater than in the U. S., and the Canadian barley is of very high quality. In 1900 the U. S. produced 119,634,877 bushels of barley. Barley is better adapted for cold climates than any other grain, and some of the coarser varieties are cultivated where no other cereal can be grown. Some species of the genus are mere grasses. *Pot* or *Scotch barley* is the grain deprived of the husk in a mill. *Pearl barley* is the grain polished and rounded and deprived of husk and pellicle. *Patent barley* is the *farina* obtained by grinding pearl barley.

Barnacle

Barley-water, a decoction of pearl barley, is used in medicine. See colored plate, Grains—Wheat.

Barley-sugar, pure sugar melted and allowed to solidify into an amorphous mass without crystallizing.

Bar'low, JOEL (1754-1812), an American poet, politician, and pamphleteer. After an active and changeful life as chaplain, lawyer, editor, land-agent, lecturer, and consul, he went to Paris and acquired a fortune. On his return to America he was appointed minister plenipotentiary to France (1811), but died near Cracow on his way to meet Napoleon. His principal poem, *The Columbiad*, dealing with American history from the time of Columbus, was published in 1807.

Barlow, SAMUEL LATHAM MITCHELL (1826-89), b. in Granville, Mass. At the age of fourteen years he entered a law office, and after studying seven years he set up in business for himself. A trip to Europe in behalf of an Illinois railway, in the year the firm was started brought him \$50,000. The act by which he gained his widest fame was the lawsuit which expelled Jay Gould from the control of the Erie railway after the death of James Fisk, Jr. Mr. Barlow was elected one of the directors of the road under the new management, and was retained as its private counsel. Mr. Barlow was a Democrat, but never held any political office.

Bar'mecides (-sidz), a distinguished Persian family, whose virtues and splendor form a favorite subject with Mohammedan poets and historians. Two eminent members of this family were Khaled-ben-Barmek, tutor of Harun-al-Rashid, and his son, Yahya, grand vizier of Harun.

Bar'mecide's Feast, a phrase proverbial for a feast on imaginary dainties, and originating in the story of the barber's sixth brother, in the *Arabian Nights*.

Bar'men, a German city in the Prussian Rhine Province, government of Düsseldorf, and forming a continuation of the town of Elberfeld, in the valley of Barmen. It has extensive ribbon and other textile manufactures; also dye-works, manufactures of chemicals, metal wares, buttons, yarns, iron, machines, pianos, organs, soap, etc. Pop. 116,144.

Bar'nabas, the surname given by the apostles to Joses, a fellow laborer of Paul, and, like him, ranked as an apostle. He is said to have founded at Antioch the first Christian community, to have been first bishop of Milan, and to have suffered martyrdom at Cyprus.

Bar'nacle, the name of a family of marine crustaceous animals. They are enveloped by a mantle and shell, composed of five principal valves and several smaller pieces, joined together by a membrane attached to their circumference; and they are furnished with a long, flexible, fleshy stalk or peduncle, provided with muscles, by which they attach themselves to ships' bottoms, submerged timber, etc. They feed on small marine animals, brought within their reach by the water and secured by their tentacula. Some of the

Barnacle Goose

larger species are edible. According to an old fable these animals produced barnacle geese.

Barnacle Goose, a summer visitant of the northern seas, in size rather smaller than the common wild goose, and having the forehead and cheeks white, the upper body and neck black. A fable asserts that the crustaceans called barnacles changed into geese, and various theories have been framed to account for its origin. The Brent Goose is also sometimes called the Barnacle Goose, but the two should be discriminated.

Barnardo, THOMAS J., a British philanthropist, founder of the Barnardo Homes for homeless children, where they receive an industrial training, are saved from a possible career of crime, and enabled to achieve an honorable position in life. Dr. Barnardo has also under his direction many separate institutions in the United Kingdom and the colonies, a house for babies, a hospital for children, an immigration depôt in Ontario, and an industrial farm in Manitoba.

Barnato, BARNEY, a South African multimillionaire, was born in London, became a juggler, and went to South Africa. He became a leading operator in the shares of diamond companies, and was associated with Cecil Rhodes to control the diamond output of South Africa. His wealth at one time was estimated at \$500,000,000. He committed suicide in 1897, while going from Capetown to England.

Barney, JOSHUA (1759-1818), American naval officer. When the American Revolution began Barney was appointed master's mate of the sloop *Hornet*, fitted out in Baltimore, and in November, 1775, joined Commodore Hopkins's squadron at Philadelphia. After the fleet had captured New Providence and the Bahamas, it returned to Philadelphia, and Barney was transferred to the sloop *Wasp*. He was afterward transferred to the frigate *Virginia* as first officer. After five months' confinement in a prison-ship in New York, he was exchanged, and again captured, when he was sent for imprisonment to England, but escaped in the undress uniform of a British officer. Eventually he found his way back to Philadelphia, where he was placed in command of the ship *Hyder Ali*. While conveying a fleet of merchantmen down the Delaware River he captured the British ship *General Monk*, after an engagement of twenty-six minutes. Though only twenty-three years of age, he was promoted by Congress to the rank of commodore, and received from the state of Pennsylvania a gold-hilted sword. In the War of 1812 Barney was appointed commander of the gunboat flotilla, organized for the defense of Chesapeake Bay. On Aug. 26, 1814, at the battle of Bladensburg he did all the fighting of that day. Here he was wounded and taken prisoner, exchanged six weeks later, and at once resumed his command. For his services at this battle the city of Washington voted him an elegant sword.

Barns'ley, a town of England, W. Riding of Yorkshire. Its staple industries are the manufacture of linens, iron, and steel, and there are

Barnum

numerous collieries in the neighborhood. Pop. 35,427.

Barnum, PHINEAS TAYLOR (1810-1891), American showman, b. at Bethel, Conn. His father was tailor, farmer, and tavern-keeper in turn. At thirteen young Barnum was employed in a country store; and about five years afterward, went largely into the lottery business. When only nineteen he married clandestinely, and then moved to Danbury, where he edited *The Herald of Freedom*, and was imprisoned sixty days for a libel. In 1834 he removed to New York, where hearing of Joice Heth, the reputed nurse of General Washington, he bought her for \$1,000, and with the aid of wholesale advertising, exhibited her to considerable profit. He continued in the show business from 1836 to 1839, but reduced again to poverty, he sold Bibles, exhibited negro dancers, and wrote for newspapers, until in 1841 he bought Scudder's American Museum in New York, which he raised at once to prosperity by exhibiting a Japanese mermaid, made of a fish and monkey, a white negress, a woolly horse, and finally a noted dwarf (Charles S. Stratton of Bridgeport), styled Gen. Tom Thumb, whom he exhibited in Europe in 1844. In 1847 he offered Jenny Lind \$1,000 a night for 150 nights, and received \$700,000—the concert tickets being sold at auction, in one case as high as \$650 for a single ticket. He built a villa at Bridgeport, in imitation of the Brighton Pavilion, and engaged in various speculations, one of which—a clock factory—made him bankrupt. Settling with his creditors in 1857, he engaged anew in his career of audacious enterprises, and made another fortune. In 1866 he was a candidate for a seat in Congress, but was unsuccessful. His *Autobiography* (1854, since greatly enlarged) has the merit at least of frankness. In 1865 he published *The Humbugs of the World*; in 1869, *Struggles and Triumphs*; and in 1883, *Money-getting*. In 1868 he relinquished the business of showman, resuming it, however, in 1871, when he organized a museum, menagerie, circus, etc., which required 500 men and horses to transport it through the country. For his hippodrome in New York he purchased for \$165,000 from Messrs. Sanger, London, in 1874, a duplicate of the whole plant for the pageant "Congress of Monarchs." His "Greatest Show on Earth" required 100 railway cars for its conveyance, every one of which was his own property. In 1879 he estimated the number of his patrons up to date as 90,000,000. In 1882 the receipts in a single day for his Great Show when in Boston amounted to over \$15,000; for ten days, over \$105,000. In 1882 he purchased for \$10,000 from the London Zoological Society the elephant "Jumbo." Mr. Barnum had his own statue prepared while he was alive. The statue is of bronze, about 7 ft. in height, and represents him seated in a great arm-chair. It was made in Europe, on his personal order, and, on arrival in America, in 1887, from Bremen, was packed away in one of the great storage warehouses of New York, with instructions that no one should be permitted to see it until after his death.

Baro'da, a non-tributary state, but subordinate to the Indian government; situated in the north of the Bombay presidency. It consists of a number of detached territories in the province of Guzerat, and is generally level, fertile, and well cultivated, producing luxuriant crops of grain, cotton, tobacco, opium, sugar-cane, and oil-seeds. There is a famous breed of large white oxen used as draught cattle. Area 8,226 sq. mi.; pop. 2,415,396. Baroda, the capital, is the third city in the Bombay presidency. Pop. 116,420 (including troops in the adjoining cantonment).

Barometer, an instrument for determining atmospheric pressure. Experimenting with a closed tube filled with mercury inverted in a cup of the same metal, Torricelli noted that the pressure of the atmosphere supports a column of mercury 30 inches high. Pascal repeated and verified the experiment (1645). Perrier (1636) discovered that the height of the mercury varied with the weather. The *cistern* barometer consists of a glass tube 33 inches long, bore one third inch. The tube, hermetically sealed at the top, curves up at the bottom terminating in a glass bulb open to the atmosphere. Purified mercury fills the tube, and a scale marks the height of the column. In general, the rising of the mercury presages fair weather, and its falling the contrary, a great and sudden fall being the usual presage of a storm.

The *siphon* barometer consists of a bent tube, generally of uniform bore, having two unequal legs, the longer closed, the shorter open. A sufficient quantity of mercury having been introduced to fill the longer leg, the instrument is set upright, and the mercury takes such a position that the difference of the levels in the two legs represents the pressure of the atmosphere. In the best siphon barometers there are two scales, one for each leg, the divisions on one being reckoned upward, and on the other downward from an intermediate zero point, so that the sum of the two readings is the difference of levels of the mercury in the two branches.

The *wheel* barometer is the one that is most commonly used for domestic purposes. It is far from being accurate, but it is often preferred for ordinary use on account of the greater range of its scale, by which small differences in the height of the column of mercury are more easily observed. It usually consists of a siphon barometer, having a float resting on the surface of the mercury in the open branch, a thread attached to the float passing over a pulley, and having a weight as a counterpoise to the float at its extremity. As the mercury rises and falls, the thread and weight turn the pulley, which again moves the index of the dial.

The *mountain* barometer is a portable mercurial barometer with a tripod support and a long scale for measuring the altitude of mountains. To prevent breakage, through the oscillations of such a heavy liquid as mercury, it is usually carried inverted, or it is furnished with a movable basin and a screw, by means

of which the mercury may be forced up to the top of the tube. For delicate operations, such as the measurement of altitudes, the scale of the barometer is furnished with a nonius or vernier, which greatly increases the minuteness and accuracy of the scale. In exact barometric observations two corrections require to be made, one for the depression of the mercury in the tube by capillary attraction, the other for temperature, which increases or diminishes the bulk of the mercury. In regard to the measurement of heights the general rule is to subtract the ten-thousandth part of the observed altitude for every degree of Fahrenheit above 32°.

In the *aneroid* barometer, as its name implies (Gr. *a*, not, *neros*, liquid), no fluid is employed, the action being dependent upon the susceptibility to atmospheric pressure shown by a flat circular metallic chamber from which the air has been partially exhausted, and which has a flexible top and bottom of corrugated metal plate. By an ingenious arrangement of springs and levers the depression or elevation of the surface of the box is registered by an index on the dial, by which means it is also greatly magnified, being given in inches to correspond with the mercurial barometer. Aneroids are, however, generally less reliable than mercurial barometers, with which they should be frequently compared.

Barque (bärk), a three-masted vessel of which the foremast and mainmast are square-rigged, but the mizzenmast has fore-and-aft sails only.

Barquesimeto (bär-kä-sē-mā'tō), a city in the north of Venezuela, capital of the province of Barquesimeto. Pop. 31,476. It was founded in 1522, named New Segovia, and destroyed by earthquake in 1812.

Bar'ra (or Bar), a small kingdom in Africa, near the mouth of the Gambia. The Mandingoes, who form a considerable part of the inhabitants, are Mohammedans and the most civilized people on the Gambia. Pop. 200,000. The coast here belongs to Great Britain.

Barra, an island of the Outer Hebrides, w. coast of Scotland, belonging to Inverness-shire. On the w. coast the Atlantic, beating with all its force, has hollowed out vast caves and fissures. Large herds of cattle and flocks of sheep are reared on the island. Pop. 2,365; area 348 sq. mi.

Barrackpur (pör'), a town and military cantonment, Hindustan, on the left bank of the Hugli, 10 miles n.e. of Calcutta. Here occurred the first outbreak of the Indian mutiny. Pop. 56,627.

Barranquilla (bär-rän-kēl'yá), a town of South America, in Colombia, on a branch of the river Magdalena, near its entrance into the Caribbean Sea, connected by rail with the seaport Sabanilla. Pop. 11,595.

Barras (bä-rä), PAUL FRANÇOIS JEAN NICHOLES, Comte de (1755-1829), member of the French national convention and of the executive directory. After serving in the army in India and Africa he joined the revolutionary party and was a deputy. He took part in the

Barre

attack upon the Bastille and upon the Tuilleries, and voted for the death of Louis XVI. On Feb. 4, 1795, he was elected president of the convention, and on Oct. 5, Barras for a second time received the chief command of the forces of the convention. From 1797 he governed absolutely until June 13, 1799, when Siyès entered the directory, and in alliance with Bonaparte procured his downfall. He afterward resided at Brussels, Marseilles, Rome, and Montpellier under surveillance, returning to Paris only after the restoration of the Bourbons. His memoirs were suppressed and seized, but were published recently.

Barre, Washington co., Vt., the seat of Goddard Seminary. Pop. 1900, 8,448.

Barren Grounds, a large tract in the n.w. territories of Canada, extending northward from Churchill River to the Arctic Ocean between Great Bear and Great Slave Lake and Hudson's Bay. It largely consists of swamps, lakes, and areas of bare rock with dwarf birches and willows in certain parts. The reindeer and musk-ox are among the animals.

Barrett, LAWRENCE, actor, b. 1838, in Pater-son, N. J. He made his *début* at Detroit, Mich., in 1853, as "Murad," in the drama of the *French Spy*. In 1856 he appeared at Burton's theater in New York City, as "Sir Thomas Clifford," in *The Hunchback*. In 1861, at the beginning of the Civil War, Mr. Barrett for a time served as a captain of a company of Massachusetts infantry. Retiring from the army, he again acted in Washington, Philadelphia, and New York City. In the last-named place he was advanced to performing "Othello" to the "Iago" of Edwin Booth. In 1867 he first appeared as a star actor in San Francisco. Returning to New York City, he played with Mr. Booth in alternate parts at Booth's theater. During 1873-74 he starred in the large cities of the Union, and in 1875 renewed his connections with Booth in New York City. Later he appeared in *King Lear*, *Yorick's Love*, and Boker's *Francesca da Rimini*. For some years he traveled through the U. S. in company with Mr. Booth. Mr. Barrett has visited Europe several times. Died 1891.

Barrier Reef, a coral reef which extends for 1,260 mi. off the n.e. coast of Australia, at a distance from land ranging from 10 to 100 mi. In sailing from Sydney through Torres Straits vessels have the choice of the inner and outer routes; the former, though narrow, gives a channel of about 12 fathoms deep throughout, and protected from the sea by the reefs themselves; the outer channel is dangerous.

Barrie, JAMES M. (1860—), an English novelist. His novels deal with Scotch life, and his delineations of character are strong and pathetic. His best known works are *A Window in Thrums*, *The Little Minister*, *Sentimental Tommy*, and *Tommy and Grisel*.

Barron, JAMES (1769-1851), American naval officer. As a boy he became connected with seamanship, was made lieutenant in the navy in 1798, captain in 1799, and made commodore, in command of the *Chesapeake*, 1807. He sailed

Barry

out and was met by the British frigate *Leopard*, whose captain demanded the surrender of several alleged British deserters from among the American crew. To this demand Barron demurred, and the *Leopard* opened fire, killing three and wounding eighteen of the *Chesapeake's* men. The American ensign was hauled down, and the alleged deserters were carried away on the British vessel. The British government promptly repudiated the action of the captain of the *Leopard*, the deserters were restored, and a monetary indemnity paid to our government. Barron thereafter was tried by court-martial and suspended from rank and pay for five years. On the expiration of this term he was kept on shore duty. In 1820 Commodore Decatur was challenged by Barron to fight a duel, in which Decatur was killed, and Barron wounded.

Bar'row, a river in the s. e. of Ireland, province Leinster. It is next in importance to the Shannon, and is navigable for vessels of 200 tons for 25 mi. above the sea.

Bar'row-in-Fur'ness, a seaport and parliamentary borough of Lancashire, England. Its prosperity is due to the mines of red hematite iron-ore which abound in the district, and to the railway rendering its excellent natural harbor available. It has several large docks; besides graving-docks, a floating-dock capable of receiving vessels of 3,000 tons, a large timber pond, etc. There is an extensive trade in timber, cattle, grain, and flour; and iron-ore and pig-iron are largely shipped. It has numerous blast-furnaces, and one of the largest Bessemer-steel works in the world. Besides iron-works a large business is done in ship-building, the making of railway wagons, and rolling stock, ropes, sails, bricks, etc. Pop. 51,712.

Barrows, JOHN HENRY (1847-1902), President of Oberlin College; born at Medina, Mich., July 11, 1847; educated at Olivet College, Yale and Andover theological schools, and in Göttingen, Germany. He was called to the First Presbyterian Church in Chicago in 1881. Dr. Barrows conceived the idea of a World's Parliament of Religions in connection with the World's Columbian Exhibition, and was made its president and organizer. In 1894-5 he made a tour of the world. In 1898 he was elected President of Oberlin. He wrote *A History of the Parliament of Religions*; *Life of Henry Ward Beecher*; *Christianity, the World's Religion*, and *A World Pilgrimage*. He died June 2, 1902.

Barrow Strait, the connecting channel between Lancaster Sound and Baffin's Bay on the e. and the Polar Ocean on the w. Of great depth, with rocky and rugged shores. Named after Sir John Barrow (1764-1848), a British traveler.

Bar'ry, CHARLES (1795-1860), an English architect, born in London. After executing numerous important buildings, such as the Reform Club-house, London, St. Edward's School, Birmingham, etc., he was appointed architect of the new Houses of Parliament at Westminster, a noble pile, with the execution of which he was occupied for more than twenty-

Barry

four years. His son, EDWARD MIDDLETON, (1830-1880), was also a distinguished architect.

Barry, JOHN (1745-1803), naval officer, b. in Ireland. He was apprenticed to seamanship, and became master of a vessel. At the beginning of the Revolution he offered his services to this country, and in 1776 became commander of the *Lexington*, and captured the British tender *Edward*. He was transferred to the command of the *Effingham*. In the winter of 1776-77, he assisted at the battle of Trenton with some heavy artillery. In 1777, Barry captured a British war schooner in the Delaware River. In 1778 he commanded the *Raleigh*, which was pursued and driven on shore by a British squadron. Later he was transferred to the *Alliance*, and in a severe engagement captured the *Atalanta* and *Trepassy*. He was senior officer, with the rank of commodore in the reorganized navy in 1794.

Bar'sabab, son of Alpheus, brother of James the Less and of Jude, and one of the candidates for the apostolical office left vacant by Judas Iscariot.

Bart (Baert or Barth) (bärt), JEAN, a famous French sailor, b. at Dunkirk, 1650, the son of a poor fisherman. He became captain of a privateer, and after some brilliant exploits was appointed captain in the royal navy. In recognition of his further services he was made commodore. He made the navy of the nation everywhere respected, and furnished some of the most striking chapters in the romance of naval warfare. After the peace of Ryswick he lived quietly at Dunkirk, and d. there while equipping a fleet to take part in the War of the Spanish Succession, 1702.

Barth (bärt), HENRICH, African traveler, b. at Hamburg 1821, d. in 1865. He graduated at the University of Berlin as Ph.D. in 1844; and set out in 1845 to explore all the countries bordering on the Mediterranean. His explorations, which extended over an area of about 2,000,000 sq. mi., determined the course of the Niger and the true nature of the Sahara.

Barthé'lmey - Saint - Hilaire (bär-täl-mē), JULES (1805-1887), French scholar and statesman. He was professor of Greek and Latin philosophy in the College of France, but resigned the chair after the *coup d'état* of 1852 and refused to take the oath; was reappointed 1862; in 1869 was returned to the Corps Législatif; after the revolution was a member of the National Assembly; was elected senator for life in 1875. He published a translation of Aristotle, and works on Buddhism, Mohammed and Mohammedanism, the Vedas, etc.

Bartholdi (bär-tol'dē) AUGUSTE, a French sculptor, b. 1834; best known as the artist of the colossal statue of Liberty now overlooking the harbor of New York. He died in 1904.

Barthol'omew, the apostle, is probably the same person as Nathanael, mentioned in the Gospel of St. John as one of the first disciples of Jesus. He is said to have taught Christianity in the south of Arabia.

Bartholomew's Day, ST., a feast of the Church of Rome, celebrated (August 24) in honor of St. Bartholomew. What is known

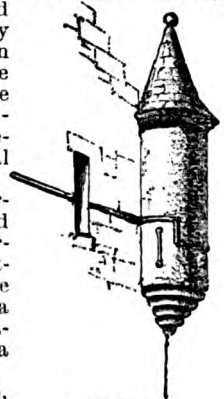
Bartolini

as the Massacre of St. Bartholomew was the slaughter of the French Protestants which began Aug. 24, 1572, by secret orders from Charles IX at the instigation of his mother, Catherine de Medici, and in which, according to Sully, 70,000 Huguenots, including women and children, were murdered throughout the country. During the minority of Charles and the regency of his mother a long war raged in France between the House of Guise and the Catholics on the one hand and the House of Conde and the Huguenots on the other. In 1570 overtures were made by the court to the Huguenots, which resulted in a treaty of peace. This treaty blinded the chiefs of the Huguenots, particularly the Admiral Coligny, who was wearied with civil war. The king appeared to have entirely disengaged himself from the influence of the Guises and his mother; he invited Coligny to his court, and honored him as a father. The most artful means were employed to increase this delusion. The sister of the king was married to the Prince de Béarn (1572) in order to allure the most distinguished Huguenots to Paris. On August 22 a shot from a window wounded the admiral. The king hastened to visit him, and swore to punish the author of the villainy; but on the same day he was induced by his mother to believe that the admiral had designs on his life. Accordingly, he consented to help her in her plans for a general massacre of the Huguenots on the night of St. Bartholomew's day. On that night, at a signal from the tower of the royal palace, the assembled companies of the House of Guise fell on the Huguenots and the bloody carnival began. Coligny was among the first to fall. Catharine, perceiving that the death of the Huguenot princes would react against her by demoralizing the party opposed to Guise and thus leave him with unlimited power, had them spared. She compelled her son to acknowledge before the parliament his sole responsibility for the massacre. The king is said to have died of remorse for his part in the affair.

Bartholomew's Hospital, ST., one of the great hospitals of London, formerly the priory of St. Bartholomew, and made a hospital by Henry VIII in 1547. On an average 6,000 patients are annually admitted to the hospital, while about 100,000 out-patients are relieved by it. A medical school is attached to it.

Bar'tizan, a small overhanging turret pierced with one or more apertures for archers, projecting generally from the angles on the top of a tower, or from the parapet, or elsewhere, as in a mediæval castle.

Bartolini (bär-to-lē'nē), LORENZO (1778-1850), a celebrated Italian sculptor, born at Florence. He studied and worked in Paris, and was pat-



Bartizan.

ronized by Napoleon. Among his greater works may be mentioned his groups of *Charity* and *Hercules* and *Lycas*, a colossal bust of Napoleon, and the beautiful monument in the cathedral of Lausanne, erected in memory of Lady Stratford Canning. Bartolini ranks next to Canova among modern Italian sculptors.

Bartolozzi (lot'sē), FRANCESCO (1725-1813), a distinguished engraver, born at Florence. He later went to London, and Lisbon, Portugal.

Barton, BERNARD, known as the Quaker poet, b. in London 1784, d. 1849. His poetry, though deficient in force, is fluent and graceful.

Barton, CLARA, philanthropist, b. 1826, in Oxford, Mass. She first went to school in Clinton, N. Y.; became a teacher and founded a free school in Bordentown, N. J., became clerk in the U. S. patent office, 1854. When the Civil War began she devoted herself to the care of wounded soldiers on the battlefield; and in 1864 had charge of the hospitals at the front of the Army of the James. In 1865 she visited Andersonville, Ga., to mark the graves of the Union soldiery. During the war between Germany and France she volunteered her service, and was decorated with the golden cross of Baden and the iron cross of Germany. The American Red Cross Society was organized in 1881, and she became its president. In 1884, she represented the United States at the Red Cross Conference in Geneva, Switzerland, and was also a delegate to the International Peace Convention the same year, in that city. In 1883 the U. S. Senate committee on foreign relations requested her to prepare a *History of the Red Cross*. In 1898 she went to Cuba to distribute supplies furnished by the U. S. government. In 1904, she resigned the presidency of the Red Cross Society, and was succeeded by Mrs. John A. Logan. Pl. 3, Vol. I.

Bartram, JOHN (1699-1777), botanist, b. in Chester co., Pa. After studying medicine and surgery, he became interested in the study of plants. He was the first to form a botanic garden for American plants. The garden still contains some fine old trees. Mr. Bartram went on his first extensive botanical expedition, joining a mission to the Six Nations of Indians at Onondaga, and afterward traveling to Oswego, and to the partly explored shores of Lake Ontario, 1743. He published his *Observations on the Inhabitants, Climate, Soil, etc., from Pennsylvania to Onondaga, Oswego, and the Lake Ontario, etc.* (1751). His *Journal of Travels* was published in 1766. Mr. Bartram contributed several papers to the American Philosophical Society. He was a friend of Dr. Franklin. Mr. Bartram supported his family by farming, and quarried the stones for the house on the Schuylkill, which he built, and which is still standing. His son, William Bartram (1730-1823) illustrated Barton's *Elements of Botany*, and was the first to make known many curious and beautiful American plants.

Baruch (bā'ruk), a Hebrew scribe, friend and assistant to the prophet Jeremiah. One of the apocryphal books bears the name of Baruch.

Barwood, a dyewood obtained from a tall tree of West Africa. It is chiefly used for giving orange-red dyes on cotton yarns. See *Camwood*.

Bary'ta, oxide of barium, called also *heavy earth*, from its being the heaviest of the earths. It is generally found in combination with sulphuric and carbonic acids, forming sulphate and carbonate of baryta, the former of which is called *heavy-spar*. Baryta is a gray powder, has a sharp, caustic, alkaline taste, and a strong affinity for water, and forms a hydrate with that element. It forms white salts with the acids, all of which are poisonous except the sulphate. Several mixtures of sulphate of baryta and white lead are manufactured, and are used as white pigments, or it may be used alone. Carbonate of baryta, which in the natural state is known as witherite, is also used as the base of certain colors. The nitrate is used in pyrotechny, in the preparation of green fireworks.

Basalt (ba-salt'), a well-known igneous rock occurring in the ancient trap and the recent volcanic series of rocks, but most abundantly in the former. It is a fine-grained, heavy, crystalline rock, consisting of felspar, augite, and magnetic iron, and sometimes contains a little olivine. Basalt is amorphous, columnar, tabular, or globular. The columnar form is straight or curved, perpendicular or inclined, sometimes nearly horizontal; the diameter of the columns from 3 to 18 in., sometimes with transverse semispherical joints, in which the convex part of one is inserted in the concavity of another; and the height from 5 to 150 ft. The forms of the columns generally are pentagonal, hexagonal, or octagonal. When decomposed it is found also in round masses, either spherical or compressed and lenticular. These rounded masses are sometimes composed of concentric layers, with a nucleus, and sometimes of prisms radiating from a center. Fingal's Cave, in the island of Staffa, furnishes a remarkable instance of basaltic columns. The pillars of the Giant's Causeway, Ireland, composed of this stone, and exposed to the roughest sea for ages, have their angles as perfect as those at a distance from the waves. Basalt often assumes curious and fantastic forms, as for example, those masses popularly known as "Sampson's Ribs" at Arthur's Seat, Edinburgh, and "Lot" and "Lot's Wife" near the s. coast of St. Helena.

Baseball, a game played with a bat and ball which has obtained a national character in the U. S. It is played by nine players a side. A diamond-shaped space of ground, 90 feet on the side, is marked out, the corners being the "bases." One side takes the field, and the other sends a man to bat. When the field side take their places the "pitcher," standing inside the ground near the center and in front of the batsman, delivers a ball to the batsman, who stands at the "home base," and who tries to drive it out of the reach of the fielders, and far enough out of the field to enable him to run round the bases, which scores a run. If he cannot run round all he may stop at any one,

Basedow

and may be followed by another batsman. If he is touched by the ball he is out, and when three on his side are put out, the field side take the bat. Nine of these innings makes a game, which the highest score wins. The bat is of a cylindrical shape, not more than $2\frac{1}{2}$ inches in diameter nor more than 42 inches long. The ball is about 9 inches in circumference and weighs not less than 5 ounces. There are now several professional leagues of baseball clubs in the U. S., the leading one of which is the National League. Nearly every college in America has its baseball team, but these players are amateurs.

Basedow (bä'ze-dō), JOHN BERNHARD (1723-1790), German educationalist. The chief feature of Basedow's system is the full development of the faculties of the young at which he aspired, in pursuance of the notions of Locke and Rousseau.

Basel (bä'zl), a canton and city of Switzerland. The canton borders on Alsace and Baden, has an area of 177 sq. mi. and a pop. of 144,283, nearly all speaking German. It is divided into two half-cantons. The city of Basel is 43 mi. n. of Berne, and consists of two parts on opposite sides of the Rhine, and communicating by three bridges, one of them an ancient wooden structure; the older portions are irregularly built with narrow streets; has an ancient cathedral, founded 1010, containing the tombs of Erasmus and other eminent persons; a university, founded in 1459; a seminary for missionaries; a museum containing the valuable public library, pictures, etc. The industries embrace silk ribbons, tanning, paper, aniline dyes, brewing, etc. At Basel was signed the treaty of peace between France and Prussia, April 5, and that between France and Spain, July 22, 1795. Pop. 75,114.

Basel, Council of, an ecclesiastical council held at Basel from 1431 to 1449, summoned by Pope Martin V. Soon after the Council had constituted itself, the new pope, Eugenius IV, requested the cardinal legate, Cesarini, to dissolve the Council and call one a little later at Bologna. The Council refused to dissolve and proceeded to transact business. Its main objects were the union of the Greek and Latin churches, the reconciliation of the Bohemians, and the institution of certain reforms within the church. The Council was, on the whole, a failure.

Base-line, in surveying, a straight line measured with the utmost precision to form the starting point of the triangulation of a country or district.

Bashi-Bazooks', irregular troops in the Turkish army. They are mostly Asiatics, and have had to be disarmed several times by the regular troops on account of the barbarities by which they have rendered themselves infamous.

Basic Slag, the slag or refuse matter which is got in making basic steel, and which, from the phosphate of lime it contains, is a valuable fertilizer.

Bas'il, a labiate plant, a native of India, much used in cookery, especially in France,

Basin

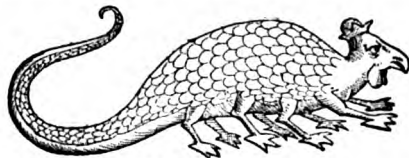
and known more particularly as sweet or common basil.

Basil, Sr., called the Great, one of the Greek fathers, was b. in 329 and made, in 370, Bishop of Caesarea in Cappadocia, where he d. in 379. The Greek church celebrates his festival January 1. The vows of obedience, chastity, and poverty framed by St. Basil are essentially the rules of all the orders of Christendom.

Basil'ica, originally the name applied by the Romans to their public halls, either of justice, of exchange, or other business. The plan of the basilica was usually a rectangle divided into aisles by rows of columns, the middle aisle being the widest, with a semi-circular apse at the end, in which the tribunal was placed.

Basilica'ta (also called Potenza), an Italian province, extending north from the Gulf of Taranto, and corresponding pretty closely with the ancient Lucania. Area 4,122 sq. mi.; pop. 459,580. Potenza (pop. 20,780) is the capital.

Bas'ilisk, a fabulous creature formerly believed to exist, and variously regarded as a kind of serpent, lizard, or dragon, and sometimes identified with the cockatrice. It inhabited the deserts of Africa, and its breath, and even its look, was fatal. The name is now



The Mythical Basilisk.

applied to a genus of saurian reptiles belonging to the family Iguanidæ, distinguished by an elevated crest or row of scales, erectible at pleasure, which, like the dorsal fins of some fishes, run along the whole length of the back and tail. The mitered or hooded basilisk is especially remarkable for a membranous bag at the back of the head, of the size of a small hen's egg, which can be inflated with air at pleasure. The other species have such hoods also, but of a less size. To this organ they owe their name, which recalls the basilisk of fable, though in reality they are exceedingly harmless and lively creatures.

Basil'ius I (820-886), a Macedonian, emperor of the East. Though he had worked his way to the throne by a series of crimes, he proved an able and equitable sovereign. The versatility, if not the depth of his intellect, is strikingly displayed in his exhortations to his son Leo, which are still extant.

Basil'ius II (958-1025), emperor of the East. He began to reign in conjunction with his brother Constantine, 975. His reign was almost a continued scene of warfare, his most important struggle being that which resulted in the conquest of Bulgaria, 1018.

Ba'sin, in physical geography, the whole tract of country drained by a river and its tributaries. The line dividing one river basin from another is the water-shed, and by tracing the various water-sheds we divide each coun-

Baskerville

try into its constituent basins. The basin of a loch or sea consists of the basins of all the rivers which run into it. In geology a basin is any dipping or disposition of strata toward a common axis or center, due to upheaval and subsidence. It is sometimes used almost synonymously with "formation" to express the deposits lying in a certain cavity or depression in older rocks. The "Paris basin" and "London basin" are familiar instances.

Bas'kerville, JOHN (1706-1775), celebrated English printer and type founder. From his press came highly prized editions of ancient and modern classics, Bibles, prayer-books, etc., all beautifully printed works.

Basket-ball, an American gymnastic game, invented in 1891 by James Naismith. It is played on an oblong space of 3500 sq. ft., with goals at each end, 10 feet above the floor. Opposing teams of five persons each play with a large inflated leather-covered ball.

Basques (bâsks) (or Biscayans), a remarkable race of people dwelling partly in the s.w. corner of France, but mostly in the n. of Spain adjacent to the Pyrenees. They are probably descendants of the ancient Iberi, who occupied Spain before the Celts. They preserve their ancient language, former manners, and national dances, and make admirable soldiers, especially in guerrilla warfare. The Basques, who number about 600,000, occupy in Spain the provinces of Biscay, Guipuzcoa, and Alâva; in France parts of the departments of the upper and lower Pyrenees, Ariège, and upper Garonne.

Bas-relief (bâ'rê-lêf or bas'rê-lêf) (bass-relief, low-relief), a mode of sculpturing figures on a flat surface, the figures having a very slight relief or projection from the surface. It is distinguished from *haut-relief* (*alto-relievo*), or high-relief, in which the figures stand sometimes almost entirely free from the ground. Bas-relief work has been described as "sculptured painting" from the capability of disposing of groups of figures and exhibiting minor adjuncts, as in a painting.

Bass (bâs), the name of a number of fishes of several genera, but originally belonging to a genus of sea-fishes of the perch family, distinguished from the true perches by having the tongue covered by small teeth and the preoperculum smooth. The only British species, called also sea-dace, and from its voracity sea-wolf, resembles somewhat the salmon in shape, and is much esteemed for the table, weighing about 15 lbs. The striped bass, an American species, weighing from 25 to 30 lbs., is much used for food, and is also known as rock-fish. Both species occasionally ascend rivers, and attempts have been made to cultivate British bass in fresh-water ponds with success. Two species of black bass, American fresh-water fishes, are excellent as food and give fine sport to the angler. The former is often called the large-mouthed black bass, from the size of its mouth. Both make nests and take great care of their eggs and young. The sea bass is an American fish of the perch family, weighing 2 to 3 lbs.

Bassora

Bass (bâs), The; a remarkable insulator trap-rock, at the mouth of the Firth of Forth, Scotland, of a circular form, about one mile in circumference, rising majestically out of the sea to a height of 313 ft. It pastures a few sheep, and is a great breeding place of solan-geese.

Bass, MICHAEL THOMAS (1799-1884), an English brewer, head of the famous firm of Bass & Co., founded in 1777. For many years the firm has been extending its connections, and now employ about 3,000 persons, with an average annual turnover of \$12,000,000. B. represented Derby in the Liberal interest from 1848 to 1883. His benefactions have been very numerous in the parish of Burton and in Derby. He more than once declined a baronetcy and a peerage. The title of Baron Burton was conferred on his son in 1886.

Bassa'no, a commercial city of North Italy, province of Vicenza. Near Bassano, Sept. 8, 1796, Bonaparte defeated the Austrian general Wurmser. Pop. 4,897.

Bassa'no (from his birthplace; real name Giacomo da Ponte), an Italian painter, b. 1510, d. 1592. He painted historical pieces, landscapes, flowers, etc., and also portraits; and left four sons, who all became painters, Francesco being the most distinguished.

Bassein (bas-sân'), a town in Lower Burmah, province of Pegu, on both banks of the Bassein river, one of the mouths of the Irrawaddy, and navigable for the largest ships. It has considerable trade, exporting large quantities of rice, and importing coal, salt, cottons, etc. Pop. 30,177. Bassein District has an area of 7,047 sq. mi. and a pop. of 389,419.

Basseterre (bâs-târ'), two towns in the West Indies. 1, Capital of the island of St. Christopher's, at the mouth of a small river, on the south side of the island. Trade considerable. Pop. 9,097. 2, The capital of the island of Guadeloupe. It has no harbor, and the anchorage is unsheltered and exposed to a constant swell. Pop. 10,649.

Bass'ia, a genus of tropical trees found in the East Indies and Africa. One species is supposed to be the shea-tree of Park, the fruit of which yields a kind of butter that is highly valued, and forms an important article of commerce in the interior of Africa. There are several other species, of which the Indian oil-tree, and the Indian butter-tree, are well-known examples, yielding a large quantity of oleaginous or butyraceous matter. The wood is as hard and incorruptible as teak.

Bassoon', a musical wind instrument of the reed order, blown with a bent metal mouth-piece, and holed and keyed like the clarinet. Its compass comprehends three octaves rising from B flat below the bass staff. Its diameter at bottom is 3 inches, and for convenience of carriage it is divided into two or more parts, whence its Italian name *fagotto*, a bundle. It serves for the bass among wood wind instruments, as hautboys, flutes, etc.

Bass'ora (or Basrah), a city in Asiatic Turkey, on the w. bank of the Shat-el-Arab (the united stream of the Tigris and Euphrates),

Bass Strait

about 50 mi. from its mouth, and nearly 300 s. e. of Bagdad. The chief exports are, dates, camels and horses, wool and wheat; imports: coffee, indigo, rice, tissues, etc. In the eighteenth century the inhabitants were estimated at 150,000; they are now about 6,000. The ruins of the ancient and more famous Bassora—founded by Caliph Omar in 636, at one time a center of Arabic literature and learning and regarded as “the Athens of the East”—lie about 9 mi. s. w. of the modern town.

Bass Strait, a channel beset with islands, which separates Australia from Tasmania, 120 mi. broad, discovered by George Bass, a surgeon in the royal navy, in 1798.

Basswood Bass, the American lime tree or linden, a tree common in N. A., yielding a light, soft timber, used for building boats and canoes.

Bast, the inner bark of exogenous trees, especially of the lime or linden, consisting of several layers of fibers. The manufacture of bast into mats, ropes, shoes, etc., is in some districts of Russia a considerable branch of industry, bast mats, used for packing furniture, covering plants in gardens, etc., being exported in large quantities. Though the term is usually restricted, many of the most important fibers of commerce, such as hemp, flax, jute, etc., are the products of bast or liber.

Bastia (bās-tē-ā), the former capital of the island of Corsica, upon the n.e. coast, 75 mi. n.e. of Ajaccio, with some manufactures, a considerable trade in hides, soap, wine, oil, pulse, etc. Pop. 23,397.

Bastiat (bās-tē-ā), FREDERIC (1801-1850), French economist and advocate of free trade. He became acquainted with Cobden and the English free traders, whose speeches he translated into French.

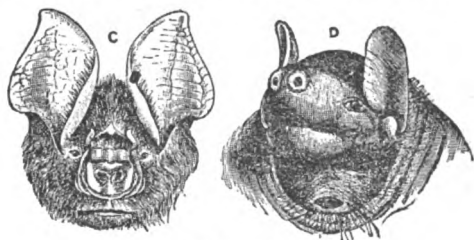
Bastille (bās-tēl'), a French name for any strong castle provided with towers, but as a proper name, the state prison and citadel of Paris, which was built about 1370 by Charles V. It was ultimately used chiefly for the confinement of persons of rank who had fallen victims to the intrigues of the court or the caprice of the government. The capture of the Bastille by the Parisian mob, July 14, 1789, was the opening act of the Revolution. On that date the Bastille was surrounded by a tumultuous mob, who first attempted to negotiate with the governor Delaunay, but when these negotiations failed, began to attack the fortress. For several hours the mob continued their siege without being able to effect anything more than an entrance into the outer court of the Bastille; but at last the arrival of some of the Royal Guard with a few pieces of artillery forced the governor to let down the second drawbridge and admit the populace. The governor was seized, but on the way to the townhall, he was torn from his captors and put to death. The next day the destruction of the Bastille commenced. Not a vestige of it exists, but its site is marked by a column in the Place de la Bastille.

Basu'toland, a native province and British South African possession. The Basutos be-

Bat

long chiefly to the great stem of the Bechuanas, and have made greater advances in civilization than perhaps any other South African race. In 1866 the Basutos, who had lived under a semi-protectorate of the British since 1848, were proclaimed British subjects, their country placed under the government of an agent, and in 1871 it was joined to Cape Colony. In 1879 the attempted enforcement of an act passed for the disarmament of the native tribes caused a revolt under the chief Moirosi, which the Cape forces were unable to put down. When peace was restored, Basutoland was disannexed from Cape Colony (1884), and is now governed by a resident commissioner under the high commissioner of South Africa. Basutoland has an area of about 10,300 sq. mi., much of it covered with grass, and there is but little wood. The climate is pleasant. The natives keep cattle, sheep, and horses, cultivate the ground, and export grain. It is divided into four districts, each presided over by a magistrate. Pop. (Europ.) 5,000; (native) 127,707.

Bat, one of the group of wing-handed, flying mammals, having the fore-limb peculiarly modified so as to serve for flight, and constituting the order Chiroptera. Bats are ani-



Bat's heads.

mals of the twilight and darkness, and are common in temperate and warm regions, but are most numerous and largest in the tropics. All European bats are small, and have a mouse-like skin. The body of the largest British species is less than that of a mouse, but its wings stretch about 15 in. During the day it remains in caverns, in the crevices of ruins, hollow trees, and such-like lurking-places, and flits out at evening in search of food, which consists of insects. Several species of the same genus are common in North America. Many bats are remarkable for having a singular nasal cutaneous appendage, bearing in some cases a fancied resemblance to a horseshoe. Two of these horseshoe bats occur in Britain. Bats may be conveniently divided into two sections—the insectivorous or carnivorous, comprising all European and most African and American species; and the fruit-eating, belonging to tropical Asia and Australia, with several African forms. An Australian fruit-eating bat, commonly known as the kalong or flying-fox, is the largest of all the bats; it does much mischief in orchards. At least two species of South American bats are known to suck the blood of other mammals, and thence are called



False vampire.



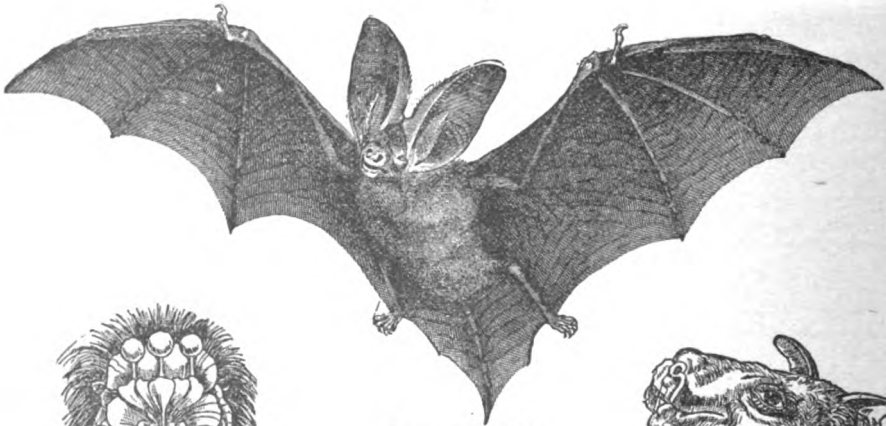
Pug-nosed bat.



Chin leafed bat.



Flying fox.



Long-eared bat.



Flower-nosed bat.



Hammer-head bat.

Batangas

"vampire-bats" (though this name has also been given to a species not guilty of this habit). As winter approaches, in cold climates bats seek shelter in caverns, vaults, ruined and deserted buildings, and similar retreats, where they cling together in large clusters, hanging head downward by the feet, and remain in a torpid condition until the returning spring recalls them to active exertions. Bats generally bring forth two young, which, while suckling, remain closely attached to the mother's teats, which are two, situated upon the chest. The parent shows a strong degree of attachment for her offspring, and when they are captured, will follow them, and even submit to captivity herself rather than forsake her charge.

Batan gas, a town of the Philippines, in the island Luzon, capital of a province of same name, 58 mi. s. of Manilla. Pop. of town and district, 29,360.

Bata via, a city and seaport of Java, on the north coast of the island, the capital of all the Dutch East Indies. It is situated on a wide, deep bay, the principal warehouses and offices of the Europeans, the Java Bank, the exchange, etc., being in the old town, which is built on a low, marshy plain near the sea, intersected with canals and very unhealthy; while the Europeans reside in a new and much healthier quarter. Batavia has a large trade, sugar being the chief export. It was founded by the Dutch in 1619, and attained its greatest prosperity in the beginning of the eighteenth century. Its inhabitants are chiefly Malay, with a considerable admixture of Chinese and a small number of Europeans. Pop. 93,613.

Batavia, Genesee co., N. Y., on Tonawanda creek, 37 mi. e. of Buffalo. Railroads: N. Y. C. & H. R.; Lehigh Valley; Erie & Tonawanda; Canandaigua & Attica branches of N. Y. C. Industries: harvester co., two flouring-mills, wood-working factory, wheel, gun, shoe, canned goods, paper box, pump and farm implement factories, and planing mill. Surrounding country agricultural. The village was first settled in 1800. Pop. 1900, 9,180.

Bates, EDWARD (1792-1869), statesman, b. in Virginia. He studied law and was attorney-general of Missouri. He served a term in Congress, 1827-28. He received forty-eight votes on the first ballot in the Republican convention of 1860, but withdrew in favor of Abraham Lincoln, who afterward made him attorney-general of the U. S.

Bath, a city of England in Somersetshire, on the Avon, which is navigable for barges from Bristol. Bath is remarkable for its medicinal waters, the four principal springs yielding no less than 184,000 gallons of water a day. Pop. 54,551.

Bath, the immersion of the body in water, or an apparatus for this purpose. The use of the bath as an institution apart from occasional immersion in rivers or the sea, is, as might be anticipated, an exceedingly old custom. Homer mentions the bath as one of the first refreshments offered to a guest; thus, when Ulysses enters the palace of Circe, a bath is pre-

Bath

pared for him, and he is anointed after it with costly perfumes. In later times, rooms both public and private, were built expressly for bathing, the public baths of the Greeks being mostly connected with the gymnasium. The fullest details we have with respect to the bathing of the ancients apply to its luxurious development under the Romans. Their bathing establishments consisted of four main sections: the undressing room, with an adjoining chamber in which the bathers were anointed; a cold room with provision for a cold bath; a room heated moderately to serve as a preparation for the highest and lowest temperatures; and the sweating-room, at one extremity of which was a vapor-bath and at the other an ordinary hot bath. After going through the entire course both the Greeks and the Romans made use of strigils or scrapers, either of horn or metal, to remove perspiration, oil, and impurities from the skin. Connected with the bath were walks, covered race grounds, tennis courts, and gardens, the whole, both in the external and internal decorations, being frequently on a palatial scale. The group of the Laocoon and the Farnese Hercules were both found in the ruins of Roman baths. With respect to modern baths, that commonly in use in Russia consists of a single hall, built of wood, in the midst of which is a powerful metal oven, covered with heated stones, and surrounded with broad benches, on which the bathers take their places. Cold water is then poured upon the heated stones, and a thick, hot steam rises, which causes the perspiration to issue from the whole body. The bather is then gently whipped with wet birch rods, rubbed with soap, and washed with lukewarm and cold water; of the latter, some pailfuls are poured over his head; or else he leaps, immediately after this sweating-bath, into a river or pond, or rolls in the snow. The Turks, by their religion, are obliged to make repeated ablutions daily, and for this purpose there is, in every city, a public bath connected with a mosque. A favorite bath among them, however, is a modification of the hot-air sudorific-bath of the ancients introduced under the name of "Turkish," into other than Mohammedan countries. A regular accompaniment of this bath, when properly given, is the operation known as "kneading," generally performed at the close of the sweating process, after the final rubbing of the bather with soap, and consisting in a systematic pressing and squeezing of the whole body, stretching the limbs, and manipulating all the joints as well as the fleshy and muscular parts. Public baths are common in the U. S. Every large city has a number of baths fitted up in very artistic style, and every house or flat has its bathtub or shower bath. There are also numerous "hot springs" in nearly every section. Among the most famous are those at Hot Springs, Garland co., Arkansas, resorted to by invalids for the cure of rheumatism and similar complaints. There are from seventy-five to one hundred springs, varying in temperature from 105° to 160°, issuing from a lofty ridge of sandstone overlooking

Bath

the town, while others rise in the bed of the stream near by. The most celebrated natural hot baths in Europe are those of Aix-la-Chapelle, and the various Baden in Germany; Toepnitz, in Bohemia; Bagnières, Baréges, and Dax, in the south of France; and Spa, in Belgium. Besides the various kinds of water-bath with or without medication or natural mineral ingredients, there are also milk, oil, wine, earth, sand, mud, and electric baths, smoke-baths and gas-baths; but these are as a rule only indulged after specific prescription. The practice of bathing as a method of cure in cases of disease falls under the head of hydropathy.

Bath, Sagadahoc co., Me., on Kennebec River, 39 mi. e. of Portland. Railroad: Maine Central. Industries: iron works, shoe factory, and ship building. Surrounding country agricultural. The town was first settled in 1780 and became a city in 1847. Pop. 1900, 10,477.

Bathom'eter, an instrument for measuring the depth of sea beneath a vessel without casting a line. It is based upon the fact that the attraction exerted upon any given mass of matter on the ship is less when she is afloat than ashore because of the less density of seawater as compared with that of earth or rock.

Bathori (bă'to-rē), a Hungarian family, which gave Transylvania five princes, and Poland one of its greatest kings. The more important members were: 1, STEPHEN (1532-1586), elected prince of Transylvania in 1571, and in 1575 king of Poland. He recovered the Polish territories in possession of the Czar of Muscovy. 2, SIGISMUND, nephew of Stephen, became prince of Transylvania in 1581, shook off the Ottoman yoke, and resigned his dominions to the Emperor Rudolph II, in return for two principalities and a pension. He returned and placed himself under the protection of the Porte, was defeated by the Imperialists in every battle, and sent to Prague, where he d. in 1613. 3, ELIZABETH, niece of Stephen, and wife of Count Nadasdy, of Hungary. She is said to have bathed in the blood of 300 young girls in the hope of renewing her youth, and to have committed other enormities. She was latterly seized and confined till her death in 1614.

Bath'urst, a British settlement on the west coast of Africa, on the island of St. Mary's, near the mouth of the Gambia, with a trade in gum, beeswax, hides, ivory, gold, rice, cotton, and palm oil. Pop. 6,000.

Bat'ley, a town of England, West Riding of York. Principal manufactures: heavy woolen cloths, such as pilot, beaver, police, army, and frieze cloths, flushings, and blankets. Pop. 28,719.

Bat'on Rouge (rōzh), E. Baton Rouge parish, the capital of Louisiana, on the left bank of the Mississippi, with an arsenal, barracks, military hospital, state-house, state university, etc. On Aug. 5, 1862, the Confederates under General Breckenridge suffered a defeat before it. Pop. 1900, 11,269.

Batoum (or Batum) (ba töm'), a port on the e. coast of the Black Sea, acquired by Russia by the Treaty of Berlin. Its importance as a

Battle Creek

naval and military station to Russia is unquestionably great, and it is one of the strongest positions on the Black Sea. The water is of great depth close inshore, and the shipping lies under protection of the overhanging cliffs of the Gouriél Mountains. Pop. 19,890.

Batrachians (ba-tră'ki-anz), the fourth order in Cuvier's arrangement of the class Reptilia, comprising frogs, toads, newts, salamanders, and sirens. The term is now often employed as synonymous with amphibia, but is more usually restricted to the order Anura or tailless amphibia.

Bat'tas, a people belonging to the Malayan race inhabiting the valleys and plateaus of the mountains that extend longitudinally through the island of Sumatra. They practise agriculture and cattle-rearing, and are skilful in various handicrafts; they have also a written literature and an alphabet of their own, their books treating of astrology, witchcraft, medicine, war, etc. They are under the rule of hereditary chieftains.

Battering-ram, an engine for battering down the walls of besieged places. The ancients employed two different engines of this kind—one suspended in a frame, the other movable on wheels or rollers. They consisted of a beam or spar with a massive metal head, and were set in motion either by a direct application of manual force or by means of cords passing over pulleys. Some are said to have been 120 feet or more in length, and to have been worked



Battering-ram.

by 100 men. One is described as being 180 feet long, and having a head weighing 1½ tons. They were generally covered with a roof or screen for the protection of the workers. They have been used recently in Irish evictions and evoked much indignation from the Nationalist party.

Battery, in criminal law, an assault by beating or wounding another. The least touching or meddling with the person of another against his will may be held to constitute a battery.

Batthyanyi (băt-yăn'yē), one of the oldest and most celebrated Hungarian families, traceable as far back as the ninth century. Among later bearers of the name have been: COUNT CASIMIR BATTHYANYI, who was associated with Kossuth, was minister of foreign affairs in Hungary during the insurrection of 1849, and d. in Paris 1854; COUNT LOUIS BATTHYANYI, (1809-1849), was leader of the opposition in the Hungarian diet until the breaking out of the commotions of 1848, when he took an active part in promoting the national cause.

Battle Creek, Calhoun co., Mich., on Kalamazoo and Battle Creek Rivers, 160 mi. e. of

Chicago. Railroads: Michigan Central; Grand Trunk; Lake Shore; Cincinnati, Jackson & Mackinaw. Industries: threshing machine factories, flour mills, iron foundries, pump factories and several pure food establishments. Battle Creek is the headquarters of the Seventh Day Adventists, who maintain a large sanitarium with a hospital and dormitory, homes for children and the aged and an extensive publishing plant.

Surrounding country is agricultural. Battle Creek became a city in 1860. Pop. 1900, 18,536.

Baudry (bō-drē), PAUL JACQUES AIME (1828-1886), a prominent French painter. The decoration of the *foyer* of the New Opera House at Paris was intrusted to him—an enormous work, occupying a total surface of 500 sq. meters, but accomplished by him in eight years.

Bauer (bou'er), BRUNO (1809-1882), German philosopher, historian, and Biblical critic of the rational school.

Baumgarten (boum'gār-tn), ALEXANDER GOTTLIEB (1714-1762), a German philosopher. He was the founder of æsthetics as a science, and the inventor of this name.

Baur (bour), FERDINAND CHRISTIAN (1792-1860), German theologian, founder of the "Tübingen School of Theology."

Bautzen (bout'sen) (or Budissin), German town in the kingdom of Saxony. Chief manufactures: woollens, paper, gunpowder, machines. Napoleon defeated the united armies of the Russians and the Prussians at Bautzen on May 21, 1813. Pop. 21,516.

Bava'ria (German, Baiern; French, Bavière), a kingdom in the south of Germany, the second largest state of the empire. Total area 29,657 sq. mi. The main political divisions are: Upper Bavaria, Lower Bavaria, Palatinate, Upper Palatinate, Upper Franconia, Middle Franconia, Lower Franconia, Swabia. After Munich the chief towns are, Nürnberg, Augsburg, Würzburg, and Ratisbon (Regensburg). The principal articles manufactured are, linens, woollens, cottons, leather, paper, glass, earthen and iron ware, jewelry, etc. The optical and mathematical instruments made are excellent. A most important branch of industry is the brewing of beer, for which there are upward of 7,000 establishments, producing over 260 millions of gallons a year. A number of the people maintain themselves by the manufacture of articles in wood, and by felling and hewing timber.

In art Bavaria is best known as the home of the Nürnberg school, founded about the middle of the sixteenth century by Albert Dürer. Hans Holbein is also claimed as a Bavarian; and to these have to be added the eminent sculptors, Kraft and Vischer, both b. about the middle of the fifteenth century. The restoration of the reputation of Bavaria in art was chiefly the work of Ludwig I, under whom the capital became one of the most prominent seats of fine arts in Europe.

The Bavarian crown is hereditary in the male line. The executive is in the hands of the king. The legislature consists of two

chambers: one of senators composed of the princes of the royal family, the great officers of the state, the two archbishops, the heads of certain noble families, and certain members appointed by the crown; the other of deputies, 159 in number, nominated by the electors, who are themselves elected, 1 for every 500 of the population. The lower chamber is elected for six years. Bavaria sends six members to the German Federal Council (Bundesrath) and forty-eight deputies to the Imperial Diet (Reichstag). The army (peace footing, 32,820; war footing, 112,016) is raised by conscription—every man being liable to serve from January 1 of the year in which he completes his twentieth year. In time of peace it is under the command of the king of Bavaria, but in time of war under that of the emperor of Germany, as commander-in-chief of the whole German army.

History.—The Bavarians take their name from the Boii, a Celtic tribe whose territory was occupied by a confederation of Germanic tribes called after their predecessors Boiarii. These were made tributary first to the Ostrogoths, and then to the Franks, and on the death of Charlemagne, his successors governed the country by lieutenants with the title of margrave, afterward converted (in 921) into that of duke. In 1070 Bavaria passed to the family of the Guelphs, and in 1180 by imperial grant to Otho, count of Wittelsbach, founder of the still reigning dynasty. In 1623 the reigning duke was made one of the electors of the empire. Elector Maximilian II joined in the war of the Spanish succession on the side of France, and this led, after the battle of Blenheim, 1704, to the loss of his dominions for the next ten years. His son, Charles Albert, likewise lost his dominions for a time to Austria, but they were all recovered again by Charles's son, Maximilian III (1745). In the wars following the French Revolution, Bavaria was in a difficult position between France and Austria, but latterly joined Napoleon, from whom its elector Maximilian IV received the title of king (1805), a title afterward confirmed by the treaties of 1814 and 1815. King Maximilian I was succeeded by his son Ludwig (or Louis) I, under whom various circumstances helped to quicken a desire for political change. Reform being refused, tumults arose in 1848, and Ludwig resigned in favor of his son, Maximilian II, under whom certain modifications of the constitution were carried out. At his death in 1864 he was succeeded by Ludwig II. In the war of 1866 Bavaria sided with Austria, and was compelled to cede a small portion of its territory to Prussia, and to pay a war indemnity of \$12,500,000. Soon after Bavaria entered into an alliance with Prussia, and in 1867 joined the Zollverein. In the Franco-German War of 1870-71 the Bavarians took a prominent part, and it was at the request of the king of Bavaria, on behalf of all the other princes and the senates of the free cities of Germany, that the king of Prussia agreed to accept the title of Emperor of Germany.

Baxter

Since January, 1871, Bavaria has been a part of the German empire, and is represented in the Bundesrath by six, and in the Reichstag by forty-eight members. The eccentricity early displayed by Ludwig II, developed to such an extent that in June, 1886, he was placed under control, and a regency established under Prince Luitpold (Leopold). The change was almost immediately followed by the suicide of the king, and as Prince Otto, the brother and heir of the late king, was insane, the regency was continued: See also *Germany*.

Baxter, RICHARD (1615-1691), the most eminent of the English nonconforming divines of the seventeenth century. The imposition of the oath of universal approbation of the doctrine and discipline of the Church of England detached him from the Establishment. He condemned the execution of the king and the election of Cromwell. At the Restoration he became king's chaplain. In 1685 he was arrested and imprisoned. He left about 150 treatises, of which his *Saint's Everlasting Rest*, and *Call to the Unconverted*, have been the most popular.

Bay, the laurel tree, noble laurel, or sweet-bay; but the term is loosely given to many trees and shrubs resembling this. A fatty or fixed oil (used in veterinary medicine) and also a volatile oil is obtained from the berries, but what is called "bayberry oil" is also obtained from the genus candleberry.

Ba'ya, the weaver-bird, an interesting East Indian passerine bird, somewhat like the bullfinch. Its nest resembles a bottle, and is suspended from the branch of a tree. The entrance is from beneath, and there are two chambers, one for the male, the other for the female. The bay is easily tamed, and will fetch and carry at command.

Bayamo (bā-'jā-mō) (or St. Salvador), a town in the east of Cuba, near the Cauto; pop. 4,560.

Bayard, JAMES ASHETON (1767-1815), statesman, b. in Philadelphia. He was descended from a Huguenot family which settled in Manhattan in the seventeenth century. He graduated at Princeton in 1784, studied law in Philadelphia, was admitted to the bar in 1787, and settled in Wilmington, Del. In 1796 he was elected to Congress as a Federalist. In 1804 he was made U. S. senator. He served from Jan. 15, 1805, till March 3, 1813, and opposed the declaration of war against Great Britain in 1812. President Madison appointed him a commissioner with Albert Gallatin and John Quincy Adams to negotiate a peace with Great Britain. He was appointed U. S. minister to Russia, but declined the office and returned to Wilmington, 1814. His two sons, Richard Henry and James A., were successively senators from Delaware.

Bayard, NICHOLAS (1644-1707), b. in Alphen, Holland, d. in New York City; a nephew of Governor Stuyvesant. The old Bayard grounds and mansion in New York City were on the west side of the Bowery, and included the territory now occupied by Lafayette Place, Astor Place, and beyond. In 1664 Nicholas became clerk of the council; was private secretary to Governor

Bayonne

Stuyvesant and surveyor of the province. In 1672 he was appointed secretary of the province, and was mayor of New York City and a member of the governor's council in 1685.

Bayard, THOMAS FRANCIS, American statesman, b. at Wilmington, Del., 1828, educated at Flushing, studied law, and in 1868 was elected U. S. senator, where he served till 1884. In 1885 he was made secretary of state in Mr. Cleveland's cabinet. March 30, 1893, was appointed ambassador extraordinary and plenipotentiary to England. D. Sept. 28, 1898.

Bay City, a city of Michigan, on the east side of Saginaw River, near its mouth in Saginaw Bay, Lake Huron. Chief articles of trade, lumber and salt. Pop. 1900, 27,628.

Bayeux (bā-you), an ancient town, France, dep. Calvados, 16 mi. n.w. of Caen, with manufactures of lace, calico, and porcelain. In its cathedral, said to be the oldest in Normandy, was preserved for a long time the famous Bayeux tapestry. Pop. 8,102.

Bayeux Tapestry, so called because it was originally found in the cathedral of Bayeux, in the public library of which town it is still preserved. It is supposed to have been worked by Matilda, queen of William the Conqueror. It is 214 ft. in length and 20 in. in breadth, and is divided into seventy-two compartments, the subject of each scene being indicated by a Latin inscription. These scenes give a pictorial history of the invasion and conquest of England by the Normans, beginning with Harold's visit to the Norman court, and ending with his death at Hastings.

Bay-leaf, the leaf of the sweet-bay or laurel tree. These leaves are aromatic, and are used in cookery and confectionery.

Bayley, JAMES ROOSEVELT (1814-1877), b. in New York City, educated for the Episcopal ministry, and in 1840-41 held a rectorship in Harlem, N. Y. He became a Roman Catholic in 1842, was ordained to the priesthood in 1844, and became first bishop of Newark, N. J., in 1853. In 1872 he was transferred to the archiepiscopal see of Baltimore.

Bayly (bā'li), THOMAS HAYNES (1797-1839), English poet, novelist, dramatist and miscellaneous writer. As a song writer he was most prolific and most popular. *The Soldier's Tear*, *We Met—'twas in a Crowd*, and a few others, are still well known.

Bay Mahogany, that variety of mahogany exported from Honduras. It is softer and less finely marked than the variety known as Spanish mahogany, but is the largest and most abundant kind.

Bayonne (bā-yon), a well-built fortified town, the largest in the French dep. Basses-Pyrénées. Catherine de Medici had an important interview with the Duke of Alba in Bayonne, June, 1565, at which it is said the massacre of St. Bartholomew was arranged. It was also the scene of the abdication of Charles IV of Spain in favor of Napoleon (1808). In 1814 the British forced the passage of the Nive and invested the town, from which the French made a desperate but unsuccessful sortie. Pop. 23,120.

Bayonne

Bayonne, Hudson co., N. J., on Kill von Kull River, 7 mi. e. of New York City. Railroads: Central R. R. of New Jersey with 5 stations. Industries: oil works, chemical works. The city was incorporated in 1869 and includes what was formerly known as Bergen Point, Centerville, Constable Hook, Bayonne, and Pamrapo, and is populated by people doing business in New York. Population 1900, 32,722.

Bayou (bā-yō'), a name given in the Southern States to a stream which flows from a lake or other stream; frequently used as synonymous with creek or tidal channel.

Bay Rum, a spirit obtained by distilling the leaves of *Myrica acris*, or other West Indian trees of the same genus. It is used for toilet

Beaconsfield

general of division in 1862, and in 1864 was made a marshal of France.

Bazar' (or bazaar'), in the East an exchange, market-place, or place where goods are exposed for sale, usually consisting of small shops or stalls in a narrow street or series of streets. These bazar streets are frequently shaded by a light material laid from roof to roof, and sometimes are arched over. Marts for the sale of miscellaneous articles, chiefly fancy goods, are now to be found in most European cities bearing the name of *bazars*. The term bazar is also applied to a sale of miscellaneous articles, mostly of fancy work, and contributed gratuitously in the furtherance of some charitable or other purpose.

Bdellium (del'i-um), an aromatic gum resin



Part of Bayeux Tapestry—Battle of Hastings.

purposes, and as a liniment in rheumatic affections.

Bay-salt, a general term for coarse-grained salt, but properly applied to salt obtained by spontaneous or natural evaporation of seawater in large shallow tanks or *bays*.

Bay-window, a window forming a recess or bay in a room, projecting outward, and rising from the ground or basement on a plan rectangular, semi-octagonal, or semi-hexagonal, but always straight-sided. The term is, however, also often employed to designate a *bow-window*, which more properly forms the segment of a circle, and an *oriel-window*, which is supported on a kind of bracket, and is usually on the first floor.

Baza (bā'thā), an old town of Spain, Andalusia, province of Granada, formerly a large and flourishing city. In 1810 the French, under Marshal Soult, here defeated the Spaniards under Generals Blake and Freire. Pop. 12,895.

Bazaine (bā-zān), FRANÇOIS ACHILLE (1811-1888), French general. He served in Algeria, in Spain against the Carlists, in the Crimean War, and joined the Mexican expedition as

brought chiefly from Africa and India, in pieces of different sizes and figures, externally of a dark reddish brown, internally clear, and not unlike glue. To the taste it is slightly bitterish and pungent; its odor is agreeable. It is used as a perfume and a medicine, being a weak deobstruent.

Beachy Head, a promontory in the s. of England, on the coast of Sussex, rising 575 feet above sea-level, with a revolving light, visible in clear weather from a distance of 28 mi. A naval battle took place here, June 30, 1690, in which a French fleet under Tourville defeated an English and Dutch combined fleet under Lord Torrington.

Beaconsfield (bē'konz-fēld), a village of Buckinghamshire, England, the parish church of which contains the remains of Edmund Burke. It gave the title of earl to the English statesman and novelist, Benjamin Disraeli.

Beaconsfield, BENJAMIN DISRAELI, Earl of (1804-1881), an eminent English statesman and novelist, of Jewish extraction; eldest son of Isaac D'Israeli, author of the *Curiosities of Literature*. In 1826 he published *Vivian Grey*, his first novel; and subsequently traveled in

Bead-snake

Italy, Greece, Turkey, and Syria. In 1831 the *Young Duke* came from his pen. It was followed by *Contarini Fleming*, *Abroy*, *Henrietta Temple*, *Venetia*, the *Revolutionary Epic*. In 1835 he unsuccessfully contested Taunton as a Tory. In 1837 he gained an entrance to the House of Commons, being elected for Maidstone. During his first years in Parliament he was a supporter of Peel; but when Peel pledged himself to abolish the corn-laws, Disraeli became the leader of the protectionists. Having acquired the manor of Hughenden in Buckinghamshire, he was in 1847 elected for this county, and he retained his seat till raised to the peerage nearly thirty years later. In 1852, he became chancellor of the exchequer under Lord Derby. In 1858, he again became chancellor of the exchequer, and brought in a reform bill which wrecked the government. In 1866 the Liberals resigned, and Derby and Disraeli came into power, the latter being again chancellor of the exchequer. In 1868 he became premier on the resignation of Lord Derby. In 1874 he again became prime-minister with a strong Conservative majority, and remained in power for six years. This period was marked by his elevation to the peerage in 1876 as earl of Beaconsfield, and by the conclusion of the Treaty of Berlin in 1878. In 1880 he resigned office, though he still retained the leadership of his party. Within a few months of his death the publication of a novel called *Endymion* (his last; *Lothair* had been published ten years before) showed that his intellect was still vigorous.

Bead-snake, a beautiful snake of North America, inhabiting cultivated grounds, especially plantations of the sweet-potato, and burrowing in the ground. It is finely marked with yellow, carmine, and black. Though it possesses poison-fangs, it never seems to use them.

Beagle (bē'gl), a small hound, formerly kept to hunt hares, now almost superseded by the harrier, which sometimes is called by its name. The beagle is smaller than the harrier, compactly built, smooth-haired, and with pendulous ears. The smallest of them are little larger than the lap-dog.

Beam, a long straight and strong piece of wood, iron, or steel, especially when holding an important place in some structure, and serving for support or consolidation; often equivalent to *girder*. In a balance it is the part from the ends of which the scales are suspended. In a loom it is a cylindrical piece of wood on which weavers wind the warp before weaving; also the cylinder on which the cloth is rolled as it is woven. In a ship one of the strong transverse pieces stretching across from one side to the other to support the decks and retain the sides at their proper distance; hence a ship is said to be "on her beam ends" when lying over on her side.

Bean, a name given to several kinds of leguminous seeds and the plants producing them, probably originally belonging to Asia. The common bean is cultivated both in fields and gardens as food for man and beast. There

Bear

are many varieties, as the mazagan, the Windsor, the long-pod, etc., in gardens, and the horse or tick bean in fields. The soil that best suits is a good strong clay. The seed of the Windsor is fully an inch in diameter; the horse-bean is much less, often not much more than half an inch in length and three eighths of an inch in diameter. Beans are very nutritious, containing 36 per cent. of starch and 23 per cent. of nitrogenous matter called legumin, analogous to the casein in cheese. The bean is an annual, from 2 to 4 feet high. The flowers are beautiful and fragrant. The *kidney-bean*, *French bean*, or *haricot*, is a well-known culinary vegetable. There are two principal varieties, annual dwarfs and runners. The bean cultivated in the U. S. is used largely as an article of food. It is known as the common bean. There are two sorts, the running and the bush, both presenting numerous varieties in size and color. These, cooked with pork, form the well-known "pork and beans." The *scarlet-runner bean*, a native of Mexico, is cultivated on account of its long rough pods and its scarlet flowers. *St. Ignatius bean* is not really a bean, but the seed of a large climbing shrub, nearly allied to the species of *Strychnos* which produces nux vomica. One of the curious products of Mexico is the jumping bean. They grow in pods, each pod containing three beans. They were often exhibited by South American jugglers, who placed them on a table, when they would immediately roll and skip about and make jumps of a couple of inches. This was at one time thought to be the effect of some magical property possessed by the beans, but it was discovered that these vegetables owe their jumping powers to a very simple agent; namely, the larva of a moth, which bores into them and, striking its head against the interior of the bean, causes it to rebound.

Bean-goose, a species of wild goose, a migratory bird which arrives in Britain in autumn and retires to the north in the end of April, though some few remain to breed. Being rather less than the common wild goose, it is sometimes called the *small gray goose*.

Bear, a beast of prey of the family *Ursidae*. Bears are large, shaggy, carnivorous mammals, closely allied to the dog in structure and also having many features in common with the badgers, weasels and skunks. They have massive heads, extended narrow jaws, and large teeth. The body appears more bulky than it really is, because of the looseness of the skin, the length of the coarse fur, the stumpy tail, and the comparative shortness of the legs. The skeleton is big and heavy and the muscles strong. The limbs are furnished with long and powerful claws for use in digging, fighting, and climbing trees. The eyes are small and weak; the ears are small and furry, but the sense of hearing is acute; the sense of smell is especially well developed. The movements of bears are clumsy, yet they can run rapidly and climb trees or scramble over rocks with remarkable agility. The voice of a bear is a whine or growl.

Bear

Bears usually make their home in some cave or crevice among rocks or in a hollow tree. There, in the early spring, the young ones, usually two in number, are born. Each bear family usually keeps pretty well to itself, instead of hunting in packs as the wolves do. Bears will eat all kinds of food. They are fond of fruits, berries, herbs, roots, eggs, ants, and honey. They capture and devour small animals in the woods and raid settlements near the woods in search of young pigs, calves, colts, and sheep. Almost all bears eat fish and reptiles and some species live almost entirely on fish.

The species of the bear family are not numerous and the family likeness is so marked in all that many of the members are difficult to distinguish. Elliott, in his *Synopsis of the Mammals of North America*, gives the following list of species of American bears: Polar bear, Kadiak bear, Dall's bear, grizzly bear, barren-ground bear, black bear, Louisiana bear, Florida bear, and glacier bear.

The polar or ice bear of the Arctic region is decidedly different from all the others. It is a large bear, some specimens being nine feet or more in length. The color is a creamy white, except the claws, which are black. The head is long and pointed, the limbs slender, and the feet large and hairy on the soles. The glacier or blue bear of the Alaskan coast is the smallest of all bears. The other American bears are so confusingly alike that conservative naturalists regard them as merely varieties of one species. The black bear is the most widespread variety, being still found in all the great forest regions north of Mexico. It is not dangerous unless wounded or enraged. The Florida and the Louisiana bears closely resemble the black bear. The barren-ground bear, a large brownish-white species, lives on the brushy plains northwest of Hudson Bay. The grizzly bear of the mountains of Western North America is one of the largest and most savage of the family. It is found from the Black Hills of Dakota westward and from Mexico to Northern Alaska. The color ranges from gray to reddish-brown. The reddish-brown varieties are known as cinnamon bears. Some weigh one thousand pounds. Formerly they were the enemies of the buffalo and deer, and now they prey upon cattle and horses of western ranches. The Kadiak bear is so called from its home on Kadiak Island, Alaska, where it was discovered in 1895. The largest known specimen of bear was a Kadiak weighing two thousand pounds. They are, however, usually smaller than the grizzlies. The color varies from a yellowish to a dark brown. Dall's bear, of the Sitka region, closely resembles the Kadiak.

Of the bears of the old world, the best known species is the brown bear of Northern Europe and Asia. This is the bear most often seen in menageries; it can be easily tamed and taught to dance and to perform various "tricks." The snow bear of the Himalayas and the Syrian bear are varieties of these species. Other Old World bears are the Himalayan and Japanese black

Beard

bears, the black sun-bear of the Malayan Peninsula and neighboring islands, and the sloth-bear or honey-bear of India and Ceylon. The honey-bear lives mainly on fruit, insects and honey. It is the bear used by Indian jugglers.

The pelt of bears is much valued for making furs, overcoats and rugs. The flesh is used for food in some parts of the world, while the fat is valuable for making the unguent called bear's grease and the claws are manufactured into ornaments.

Bear, Great and Little, the popular name of two constellations in the northern hemisphere. The Great Bear is situated near the pole. It is remarkable for its well-known seven stars, by two of which, called the pointers, the pole-star is always readily found. These seven stars are popularly called the *Wagon*, *Charles's Wain*, or the *Plow*. The Little Bear is the constellation which contains the pole-star. This constellation has seven stars placed together in a manner resembling those in the Great Bear.

Bear and Bull, or Bears and Bulls, terms frequently used in the buying and selling of stock on the stock exchange and grain on the board of trade. Bear, to tear down, is the term applied to one who attempts to lower the price of the stock or grain; and bull, to toss up, to one who attempts to raise the price. It is evident that those who wish to buy are the bears, and those who wish to sell, the bulls. To "bear stock" or to "bull stock" are phrases in common use and mean to lower or raise the market price.

Bearberry, an evergreen shrub of the heath family growing on the barren moors of Scotland, Northern Europe, Siberia, and North America. The leaves are used in medicine as an astringent and tonic.

Beard, the hair upon the chin, cheeks, and upper lip, which in the human family appears at the age of puberty as a distinctive mark of the male sex. Slaves, in ancient times, were deprived of their beards, and with the Turks even now a state of servitude among the attendants of the seraglio is indicated by a shaven face. The intense love of cleanliness on the part of the Egyptians would not suffer them to wear a beard, save, according to Herodotus, in times of mourning. Among the early Greeks a thick beard was considered a mark of manliness, and the Greek philosophers thought that a certain dignity of character attached to its long growth. Shaving was introduced into Greece by Alexander the Great, who ordered his soldiers to perform that operation, and the practice continued general to the time of Justinian. During mediæval and modern times the custom has changed from time to time in different countries, a clean-shaven face being sometimes the fashion, at other times a beard. The style of wearing the beard also changes; in some countries the ruler sets the fashion.

Beard, GEORGE MILLER (1839-1883), born at Montville, Conn., graduated at Yale in 1862,

Beard

and took his degree of M. D. in 1866. Doctor Beard was a specialist on diseases of the nervous system, and wrote extensively on the medical use of electricity and other branches of medical science.

Beard, WILLIAM HOFBROOK, painter, b. in Painesville, O. 1825. He began as a portrait painter about 1841, and settled in Buffalo in 1850, remaining until 1857. He went to Europe and studied in Switzerland, Italy, and France. In 1860 he established himself in New York City, and became a member of the Academy in 1862. He has devoted himself almost exclusively to the painting of animals.

Beardstown, Cass co., Ill., on Illinois River, 45 mi. w. of Springfield. Railroads: B. & O. S. W., and C. B. & Q. It has 6 churches, 1 high school, and 2 ward schools. Industries: 2 banks, 2 flouring mills, 1 brewery, 1 saw mill, electric light plant and a number of factories. Natural gas now used for fuel to run the engines of the mills and electric light plant. The town was founded by Thomas Beard in 1829, incorporated as a town in 1837, and became a city in 1849. Population 1900, 4,827.

Bearing, the direction or point of the compass in which an object is seen, or the situation of one object in regard to another, with reference to the points of the compass. Thus, if from a certain situation an object is seen in the direction of n.e., the *bearing* of the object is said to be n.e. from the situation. *To take bearings*, to ascertain on what point of the compass objects lie.

Bear Lake, Great, an extensive sheet of fresh water in the n.w. territory of Canada. Area about 14,000 sq. mi. The water is very clear and the lake abounds in fish.

Béarn (bā-ārn), one of the provinces into which France was formerly divided, now chiefly included in the department of Lower Pyrenees. Pau is the chief town. There is a peculiar and well-marked dialect—the Béarnese—spoken in this district, which has much more affinity with the Spanish than with the French.

Beatrice, Gage co., Neb., on Big Blue River, 90 mi. s.w. of Omaha. Surrounding country agricultural. Railroads: U. P., R. I., B. & M. P. Principal manufactures: flour, lumber, and cement. Water power furnished by the river. There are also numerous quarries of magnesia, and limestone, which is used as building material. Pop. 1900, 7,875.

Beatrice Portinari (1266-1290) (bā-ā-trō'chā-por-tō-nā'rē), the poetical idol of Dante; the daughter of a wealthy citizen of Florence, and wife of Simone de Bardi. She was but eight years of age, and Dante nine, when he met her first at the house of her father. He altogether saw her only once or twice, and she probably knew little of him. The story of his love is recounted in the *Vita Nuova*, which was mostly written after her death.

Beau'fort, the name of sixteen different towns and castles in France, of which the most important is B.-EN-VALLE'E, a town in the department of Maine-et-Loire (Anjou), 15 mi.

Beauregard

e. of Angers, with manufactures of sailcloth, leather, etc., and a trade in grain, hemp, nuts, prunes, and wine. Pop. 4,492. B. had formerly a strong castle, and gave title to the English Dukes of B.

Beauharnais (bō-ār-nā), ALEXANDRE, Viscount (1760-1794). He married Joséphine Tascher de la Pagerie, who was afterward the wife of Napoleon. He served under Rochambeau in the Revolutionary War. In 1792 he was general of the army of the Rhine. He was falsely accused of having promoted the surrender of Mainz, and was guillotined.

Beauharnais, EUGENE DE (1781-1824), Duke of Leuchtenberg, Prince of Eichstädt, and Viceroy of Italy during the reign of Napoleon. He accompanied Napoleon to Egypt in 1798; rose rapidly in the army; was appointed viceroy of Italy in 1805. To him and to Ney, France was mainly indebted for the preservation of the remains of her army during the retreat from Moscow. After the fall of Napoleon he delivered Lombardy and all Upper Italy to the Austrians. He then went to Paris, and thence to his father-in-law at Munich, where he afterward resided. His sister HORTENSE EUGENIE (1783-1837). She became Queen of Holland by marrying Louis Bonaparte. Napoleon III. was her third and youngest son.

Beaumarchais (bō-mār-shā), PIERRE AUGUSTIN CARON DE (1732-1799), a French wit and dramatist. He occupied himself with literature, and published two dramas. He first distinguished himself by his *Mémoires*, or statements in connection with a lawsuit, which by their wit, satire, and liveliness entertained all France. *The Barber of Seville* and the *Marriage of Figaro* have given him a permanent reputation. He was a singular instance of versatility of talent, being at once an artist, politician, projector, merchant, and dramatist.

Beaumont (bō'mont), FRANCIS, and **Fletcher, JOHN**, two eminent English dramatic writers, contemporaries of Shakespeare, and the most famous of literary partners.

Beaumont, WILLIAM, M. D., an American surgeon, b. 1785, d. 1853. His experiments on digestion with the Canadian, St. Martin, who lived for years after receiving a gunshot wound in the stomach which left an aperture of about two inches in diameter, were of great importance to physiological science.

Beaune (bōn), a town in France, dep. Côte d'Or, 23 mi. s.s.w. Dijon, well built, with handsome church, public library, museum, etc., and a trade in the fine Burgundy and other wines of the district. Pop. 12,470.

Beaune (bōn), FLORIMOND, a distinguished mathematician and friend of Descartes, b. at Blois 1601, d. at the same place 1652. He may be regarded as the founder of the integral calculus.

Beauregard (bō-rè-gård), PETER GUSTAVE TOUTANT DE (1818-93), American soldier. He studied at the military academy, West Point, and left it as artillery lieutenant in 1838. He served in the Mexican War, and on the outbreak of the Civil War joined the Confederates.



BRITISH POETS

**Robert Burns
John Keats**

**Lord Byron
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Beauvais

He commanded at the bombardment of Fort Sumter, gained the battle of Bull Run, lost that of Shiloh, assisted in the defense of Charleston, and aided Lee in that of Richmond.

Beauvais (bō-vā) (ancient Bellovacum), a town in France, capital of the department of Oise, with some fine edifices, the choir of the uncompleted cathedral being one of the finest specimens of Gothic architecture in France. In 1472 Beauvais resisted an army of 80,000 Burgundians under Charles the Bold. On this occasion the women particularly distinguished themselves, and one of them, Jeanne Lainé, called La Hachette, seeing a soldier planting a standard on the wall, seized it and hurled him to the ground. The banner is preserved in the townhall, and an annual procession of young girls commemorates the deed. Manufactures: tapestry and carpets, trimmings, woolen cloth, cottons, etc. Pop. 19,382.

Beaver, a rodent quadruped, about two feet in length exclusive of the tail, at one time common in the northern regions of both hemispheres, but now found in considerable numbers only in the U. S. and Canada, living in colonies, but occurring solitary in Central Eu-



Beavers and Village.

rope and Asia. It has short ears, a blunt nose, small fore-feet, large webbed hind-feet, with a flat ovate tail covered with scales on its upper surface. It is valued for its fur, which used to be largely employed in the manufacture of hats, but for which silk is now for the most part substituted, and for an odoriferous secretion named castor, at one time in high repute, and still largely used in some parts of the world as an anti-spasmodic medicine. The food of the beaver consists of the bark of trees, leaves, roots, and berries. Their favorite haunts are rivers and lakes which are bordered by forests. In winter they live in houses, which are 3 to 4 feet high, are built on the water's edge, and being substantial structures with the entrance under water afford them protection from wolves and other wild animals. These dwellings are called beaver "lodges."

Bed

and accommodate a single family. They also live in burrows. They can gnaw through large trees with their strong teeth, this being done partly to obtain food, partly to get materials for houses or dam-building. When they find a stream not sufficiently deep for their purpose they throw across it a dam constructed with great ingenuity of wood, stones, and mud.

Beaver Falls, borough in Beaver co., Pa., 81 m. n. w. of Pittsburg; on the Beaver river, 4 m. above its junction with the Ohio, and on railroads of the Pennsylvania and Erie systems. It is in a coal and natural gas region and has abundant water power. The principal manufactures are iron and steel products, tubing, glassware and pottery. It contains fine public buildings and a park called River-view. Geneva College (Reformed Presbyterian) is located here. Beaver Falls was originally called Brighton. Pop. 1900, 10,054.

Beaver, JAMES A., b. in Perry co., Pa., 1837, practiced law, and, in 1861, joined the volunteer army as a lieutenant and was made a colonel. He was wounded at Chancellorsville and lost a leg at Petersburg. He was elected governor of Pennsylvania on the Republican ticket in 1882 and in 1886.

Becerra (be-ther'á), GASPAR (1520-1570), a Spanish painter and sculptor. He studied under Michel Angelo at Rome, and is credited with the chief share in the establishment of the fine arts in Spain.

Bechuanas (Betchuanas) (bech-wan'az), a race inhabiting the central region of South Africa north of Cape Colony. They belong to the great Kaffre stem, and are divided into tribal sections. They live chiefly by husbandry and cattle rearing, and they work with some skill in iron, copper, ivory, and skins. They have been much harassed by Boers and others, and this led them to seek British protection. From 1878 to 1880 South Bechuanaland was partly administered by British officers; and in 1884 and 1885 great part of the rest of their territory was brought under British influence, the farthest northern portion of it, however, reaching to the Zambezi, being only a protectorate. The area is 180,000 sq. mi., and pop. 478,000. Chief towns: Vryburg, Mafeking, and Jaunps. Gold, coal, and copper have been found.

Beckmann, JOHANN (1739-1811), German writer on the industrial arts and agriculture. He was professor of physics and natural history at St. Petersburg, and afterward for almost forty-five years professor of philosophy and economy in Göttingen. His *History of Inventions* is well known in the English translation of it.

Becquerel (bek-rel), ANTOINE CESAR (1788-1878), French physicist. He served as an officer of engineers, and retired in 1815, after which he devoted himself to the study of electricity, especially electro-chemistry. He refuted the "theory of contact" by which Volta explained the action of his pile or battery. Becquerel may be considered one of the creators of electro-chemistry.

Bed (or stratum), is a layer of rock of simi-

Bede

lar materials, and of some thickness, cohering more or less firmly together, as a rule. Of course, in the case of soft unconsolidated strata, the materials of a bed may not be coherent. Beds are often composed of many fine laminae or plates. The laminae are the results of intermissions in the supply of materials, produced by such causes as the ebb and flow of the tide, river-floods, or the more or less turbid state of the water under which they were deposited. When the intervals between the supply of materials were short, the numerous laminae closely adhere, and form a bed cut off from the superior deposit by the occurrence of a longer interval, during which the bed became consolidated more or less before the next was deposited. When the lamination is obscure, or not distinct from the stratification, it would seem to indicate that the materials had been supplied without any intermission.

Bede (Beda, or Bæda) (672-735), known as the Venerable Anglo-Saxon Scholar, educated at St. Peter's monastery, Wearmouth; took deacon's orders in his nineteenth year at St. Paul's monastery, Jarrow, and was ordained priest at thirty. He was the most learned Englishman of his day, and in some sense the father of English history, his most important work being his *Ecclesiastical History of England*.

Bedeguar (or Bedegar) (*bed'e-gār*), a spongy excrescence or gall, sometimes termed sweet-brier sponge, found on various species of roses, and produced by several insects as receptacles for their eggs. Once thought a diuretic and vermifuge.

Bed'ford, England, county town of Bedfordshire, on the Ouse. The chief buildings are the law courts, a range of public schools, a large infirmary, county jail, etc., and the churches. There is an extensive manufactory of agricultural implements; lace is also made, and there is a good trade. John Bunyan was born at Elstow, a village near the town, and it was at Bedford that he lived, preached, and was imprisoned. A fine monument has been erected to him in the town. Pop. 28,023. Bedfordshire (or Beds) the county, is bounded by Northampton, Bucks, Herts, Cambridge, and Huntingdon. Area 463 sq. mi. Two thirds of the soil is under tillage. Besides the usual cereal and other crops, culinary vegetables are extensively cultivated for the London market. Principal manufactures: agricultural implements, and straw-plait for hats, which is made up principally at Dunstable and Luton. Pop. 160,729.

Bedford, JOHN, Duke of, one of the younger sons of Henry IV, king of England. He defeated the French fleet in 1416, commanded an expedition to Scotland in 1417, and was lieutenant of England during the absence of Henry V in France. He became regent of France, and for several years his policy was as successful as it was able and vigorous. The greatest stain on his memory is his execution of the Maid of Orleans (Joan of Arc) in 1431.

Bee

He died in 1435 at Rouen, and was buried in the cathedral of that city.

Bedlam, a corruption of Bethlehem (hospital), the name of a religious house in London, converted into a hospital for lunatics. The original Bedlam stood in Bishopsgate street, its modern successor is in St. George's Fields. The lunatics were at one time treated as little better than wild beasts, and hence Bedlam came to be typical of any scene of wild confusion. The average number of patients is about 300.

Bedouins (bed-u-ēnz'), a Mohammedan people of Arab race inhabiting chiefly the deserts of Arabia, Syria, Egypt, and North Africa. They lead a nomadic existence in tents, huts, caverns, and ruins, associating in families under sheiks, or in tribes under emirs. In respect of occupation they are only shepherds, herdsmen, and horse-breeders, varying the monotony of pastoral life by raiding on each other, and plundering unprotected travelers whom they consider trespassers. They are ignorant of writing and books, their knowledge being purely traditional and mainly genealogical. In stature they are undersized, and, though active, they are not strong. The ordinary dress of the men is a long shirt girt at the loins, a black or red and yellow handkerchief for the head, and sandals; of the women, loose drawers, a long shirt, and a large dark-blue shawl covering the head and figure. The lance is the favorite weapon.

Bee, the common name given to a large family of hymenopterous or membranous-winged insects, of which the most important is the



Black and Yellow Bee.

common hive or honey bee. It belongs to the warmer parts of the eastern hemisphere, but is now naturalized in the western. A hive commonly consists of one mother or queen, from 600 to 800 males or drones, and from 15,000 to 20,000 working bees, formerly termed neuters, but now known to be imperfectly developed females. The last mentioned, the smallest, have twelve joints to their antennae, and six

abdominal rings, and are provided with a sting; there is, on the outside of the hind legs, a smooth hollow, edged with hairs, called the *basket*, in which the kneaded pollen or bee-bread, the food of the larvæ, is stored for transit. The queen has the same characteristics, but is of larger size, especially in the abdomen; she has also a sting. The males, or drones, differ from both the preceding by having thirteen joints to the antennæ; a rounded head, with larger eyes, elongated and united at the summit; and no stings. According to Huber the working-bees are themselves divisible into two classes: one, the *cirieres*, devoted to the collection of provisions, etc.; the other, smaller and more delicate, employed exclusively within the hive in rearing the young. The mouth of the bee is adapted for both masticatory and suctional purposes, the honey being conveyed thence to the anterior stomach or crop, communicating with a second stomach in which alone a digestive process can be traced. The queen, whose sole office is to propagate the species, has two large ovaries, consisting of a great number of small cavities, each containing sixteen or seventeen eggs. The inferior half-circles, except the first and last, on the abdomen of working-bees, have each on their inner surface two cavities, where the wax, secreted by the bee from its saccharine food, is formed in layers, and comes out from between the abdominal rings. Respiration takes place by means of air-tubes which branch out to all parts of the body, the bee being exceedingly sensitive to an impure atmosphere. Of the organs of sense the most important are the antennæ, deprivation of these resulting in a species of derangement. The majority of entomologists regard their function as in the first place auditory, but they are exceedingly sensitive to tactual impressions, and are apparently the principal means of mutual communication. Bees undergo perfect metamorphosis, the young appearing first as larvæ, then changing to pupæ, from which the imago or perfect insects spring. Whether the offspring are to be female or male is said to be dependent upon the contact or absence of contact of the egg with the impregnating fluid received from the male and stored in a special sac communicating with the oviduct, unfertilized eggs producing males. The further question whether the offspring shall be queens or workers is resolved by the influence of environment upon function. The enlargement of a cell to the size of a royal chamber and the nourishment of its inmate with a special kind of food appear to be sufficient to transform an ordinary working-bee larvæ into a fully-developed female or queen bee. The season of fecundation occurs about the beginning of summer, and the laying begins immediately afterward, and continues until autumn; in the spring as many as 12,000 eggs may be laid in twenty-four days. Those laid at the commencement of fine weather all belong to the working sort, and hatch at the end of four days. The larvæ acquire their perfect state in about twelve days, and the cells are then immediately fitted up for the reception of new

eggs. The eggs for producing males are laid two months later, and those for the females immediately afterward. This succession of generations forms many distinct communities, which, when increased beyond a certain degree, leave the parent hive to found a new colony elsewhere. Thus three or four swarms sometimes leave a hive in a season. A good swarm is said to weigh at least 6 or 8 pounds.

The humblebees, or bumblebees, of which about forty species are found in Britain and over sixty in North America, belong to the genus *Bombus*, which is almost worldwide in its distribution. Of these species solitary females which have survived the winter commence constructing small nests when the weather begins to be warm enough; some of them going deep into the earth in dry banks, others preferring heaps of stone or gravel, and others choosing always some bed of dry moss. In the nest the bee collects a mass of pollen, and in this lays some eggs. The cells in these nests are not the work of the old bee, but are formed by the young insects similarly to the cocoons of silkworms; and when the perfect insect is released from them by the old bee, which gnaws off their tops, they are employed as honey-cups. The humblebees, however, do not store honey for the winter, those which survive till the cold weather leaving the nest and penetrating the earth, or taking up some other sheltered position, and remaining there till the spring. The first brood consists of workers, and successive broods are produced during the summer. The experiment of domesticating different kinds of wild bees has been tried with no satisfactory results. Some bees, from their manner of nesting, are known as "mason bees," "carpenter bees," and "upholsterer bees." Some of these bees cement particles of sand or gravel together with a viscid substance in forming their nests; others make burrows in wood. The leaf-cutter or upholsterer bee lines its burrow with bits of leaf cut out in regular shapes.

Beech, the common name of trees well known in various parts of the world, including



Branch of Common Beech. a.—flower; b.—fruit.

America, New Zealand, and Terra del Fuego. The wood is hard and brittle, and if exposed

Beecher

to the air liable soon to decay. It is, however, peculiarly useful to cabinetmakers and turners; carpenters' planes, furniture, sabots, etc., being made of it; and it is durable under water for piles and mill-slucices. The fruit or *beech mast*, when dried and powdered, may be made into a wholesome bread; it has also occasionally been roasted and used as a substitute for coffee, and yields a sweet and palatable oil used by the lower classes of Silesia instead of butter. Beech mast is, however, chiefly used as food for swine, poultry, and other animals. The leaves of the beech tree collected in the autumn, before they have been injured by the frosts, are in some places used to stuff mattresses. The North American white beech is identical with the European species.

Beecher, HENRY WARD (1813-1887), American preacher, third son of Lyman Beecher, b. Litchfield, Conn. As a child he was diffident and sensitive, loved the ocean and was only prevented from going to sea by his conversion (1826). When but eleven years old he defeated an opponent in a debate on Paine's *Age of Reason*. He showed marked talent as a debater in college. He studied theology under his father's instruction in Lane Seminary. He was pastor of a Presbyterian church in Lawrenceburg, Ind. (1837-39), and at the same time was connected with an anti-slavery paper in Cincinnati. From 1839-47 he preached in Indianapolis, contributing articles on fruits, flowers, and farming to an agricultural paper. In 1847 he took charge of Plymouth church, Brooklyn. His congregation, noted for generosity and intelligence, heartily sympathized with him in his efforts for reform, especially in his advocacy of abolition and temperance. His opinion on all public questions was eagerly sought. He was original in treatment and choice of subjects for his sermons, and his delivery was eloquent, dramatic, pathetic, and witty. In power of physical endurance he was a marvel. Tender-hearted and charitable himself, any form of injustice called from him bitter denunciations. As an after-dinner speaker he was without a peer, and his popularity as a lecturer knew no abatement. One famous oration of his was on Robert Burns, delivered January, 1859. Another, delivered April, 1865, was his Fort Sumter oration. He was a Republican and aided the cause for which it stood by pen and speech. He took part in the canvass of 1856. Through his influence and addresses, opinion in England concerning the Civil War was materially modified. His trial for adultery (1875) ended by a division of the jury, nine for acquittal and three against. His last public address was in Chickering hall, New York, Feb. 25, 1887, in favor of high license. After he came to Brooklyn he contributed his *Star Papers* to the *Independent*, of which he became editor 1861. He edited the *Christain Union* (1870-81) and was a frequent contributor to the *Ledger*. In *Plymouth Pulpit* are preserved the sermons preached from 1859 till his death. Among his many published works is a novel entitled *Norwood*. He married, 1837, Eunice White Bullard, author of *From Dawn to*

Beef

Daylight. She d. March 8, 1897. H. W. Beecher's three brothers, Charles, Edward, and Thomas, have all distinguished themselves as Congregational clergymen. His sister Catherine Esther (1800-1878) did much for the education of women, and wrote on this subject and on domestic economy. Plate 5, Vol. I.

Beecher, LYMAN (1775-1863), clergyman, b. in New Haven, Conn., graduated at Yale in 1797, and studied theology. In 1798 he was licensed to preach, accepted the pastorate of the Presbyterian church in East Hampton, L. I. A sermon on dueling, suggested by the duel between Alexander Hamilton and Aaron Burr, in 1806, made a great impression, and he soon became one of the best known preachers of New England. He was pastor of the Congregational church in Litchfield, Conn. (1810-26), and pastor of the Hanover Street church, Boston (1826-1832). He upheld the Puritan doctrine. From 1832 till 1851 Mr. Beecher was president of the Lane Theological Seminary, Cincinnati, in which he was professor of theology, and in 1832-42 was pastor of the Second Presbyterian church of Cincinnati. In 1835 Mr. Beecher was arraigned and tried for heresy by the Calvinists. He was acquitted by the general assembly, and on the division of the Presbyterian church into two factions, he joined the new school. He returned to Boston, 1851, and spent his time in publishing and revising his works. During his last 10 years he lived in Brooklyn. He was married 3 times, and his five sons, William Henry, Edward George, Henry Ward, Charles, and Thomas Kinnicut became clergymen.

Bee-eaters, a family of Fissirostral Passerine birds, distributed over Africa, India, the Moluccas, and Australia, chiefly known in Europe as common bee-eater, a summer visitant to Russia and the Mediterranean borders. For the most part they nest in colonies, depositing their eggs like the sand-martins, at the end of a tunnel sometimes 8 or 9 ft. long. They are frequently killed for their plumage, which is brownish-red and yellow above, pale-blue on the forehead, yellow at the breast, and green at the wings.

Beef-eaters, yeomen of the guard of the sovereign of Great Britain, stationed by the sideboard at great royal dinners, and dressed after the fashion of the time of Henry VII. Also a name for certain African insectorial birds which feed on the larvæ embedded in the hides of buffaloes or other large animals.

Beef, extract of. The beef is cut from the cattle for the most part from the fore-quarters. No shanks or gluey parts of the animal, but only the lean pieces are used. These are thoroughly washed and loaded into trucks and hauled away to the cooking department, consisting of a long room in which are two rows of round copper boilers. These consist of an upper and a lower hemisphere so built that they can be fastened together hermetically. The lower hemisphere is built double, the intervening space being filled with hot water. From the upper hemisphere there extends a pipe which is connected with a vacuum pump.

Beef

There is also a large eye of glass in the upper hemisphere. About 2,000 pounds of flesh are placed in a kettle with a little water, the air is pumped out, and the hot water is turned into the jacket. The meat is cooked for six or eight hours. The liquor which surrounds it is thick and pasty. The process of cooking is watched by experienced workmen through the glass windows. The liquor is now drained off and clarified, after which it is pumped through two or three filter presses which catch any impurities and retain all the fibers still left in the mass of extract. It is then poured into a vacuum pan, 7 ft. long, 12 ft. high, and 6 ft. broad, the bottom part of which is filled with steam coils, and from the top a pipe runs to the exhaust pump. Enough extract liquor is allowed to flow into the pans to cover the pipes and the free water is quickly evaporated. The extract then passes to a second vacuum pan, where it is condensed to a thick brown paste. It is then sent to a mill where it is rendered thoroughly homogeneous. It is then placed in small jars and is ready for market. Each pound of the extract contains all of the nutritive matter in 45 pounds of meat.

Beef, preparation of. In the large packing houses the preparation of beef is an interesting process. The steers are caught in long narrow pens, divided by doors into compartments large enough for two animals. The butcher passes along on a little platform just back of the pens and above them, with a large iron sledge-hammer. The object is to hit the animal just hard enough to stun it, for if it is killed outright the blood does not run so freely after the throat is cut. The animals are then slid into the slaughtering room and a workman hitches a rope to the animal's leg and raises it into the air by means of pulleys until it can be hitched to a traveling pulley running on ceiling rails. Another man cuts the animal's throat and the blood splashes down and is carried off by means of troughs in the floor to vats below, where it is taken away to the fertilizer factory (see *Blood*). The animal is now trundled along until it reaches the "header" who, with very few movements splits the skin of the head, draws it loose and severs the head from the body. The head is thrown down a chute to a room below, where one man removes the tongue, another cuts off the cheek meat, and another sends the remaining bones to the fertilizer factory. In the meantime the animal is switched off on a side-track leading toward the butchering beds. A butchering bed consists of two large iron plates set into the floor about two feet apart and full of small round holes. Four men, called the "foot-skinners," begin the work and lay back the hide from the legs of the first animal and then pass quickly to the next. The "leg-breakers" succeed them and cut off the legs at the first joint and throw them to one side. The "ripper-open," as he is called, comes next and performs his part of the work. Then the "caul-puller" removes the caul-fat, after which the "floormen" begin the skinning of the carcass. This process requires great skill and care, as

Beeswax

only the fell between the hide and the flesh must be cut. When the hide has been skinned down to the back the animal is again suspended in the air. The fell is beaten down by a man with a cleaver, and as soon as it is loosened it is spread out on the floor. The entrails are removed and sent down through a chute and the "backbone-splitter" cuts the carcass down at exactly the center of the backbone. When the two halves swing apart they are pushed along the ceiling rail into the cooling-room, where they are kept for a week or two to cure. The whole process from the time the animal leaves the killing stalls until the halves of beef hang in the cooling-room is about eight minutes. During the work of slaughtering there are several inspectors present who watch every animal. These are the government inspector, the state inspector, a representative from the city health department, and the private inspector of the company. No part of the animal is lost or wasted. The caul-fats are now utilized in the manufacture of oleomargarine oil. The common fats are rendered into tallow. The tongue, liver, and heart are sold or made into sausage. The intestines are cleaned and utilized in covering sausages of several kinds. From the stomach comes plain or honeycomb tripe and pepsin, and the gall is used by printers, painters, and dyers. The horns, shins, and blade-bones are used for knife-handles, combs, bone buttons; and the knuckles, feet, sinews, bones from the extract department, hoofs, hide trimmings, and calves' feet are utilized in the glue department and for fertilizers.

Bee-hawk, a name given to the honey-buzzard which preys on hymenopterous insects.

Beelzebub (bē-el'zē-bub) (Hebrew "the god of flies"), the supreme god of the Syro-Phoenician peoples, in whose honor the Philistines had a temple at Ekron. The origin of this worship is probably to be sought in the scourge of flies to which the hot plain of Philistia has always been subject.

Beer. See *Brewing*.

Beershe'ba, "the well of the oath," the place where Abraham made a covenant with Abimelech, and in common speech representative of the southernmost limit of Palestine, near which it is situated. It is now a mere heap of ruins near two large and five smaller wells, though it was a place of some importance down to the period of the Crusades.

Bees' wax, a solid fatty substance secreted by bees, and containing in its purified state three chemical principles—myricin, cerin, and ceroelin. It is not collected from plants, but elaborated from saccharine food in the body of the bee. It is used for the manufacture of candles, for modeling, and in many minor processes. Before beeswax is put on the market it must be whitened or bleached. The beeswax is sent to the bleaching house in the shape of loaf-shaped cakes, each weighing about 25 pounds. The cakes are broken into small pieces and put into a cedar vat about 5 ft. high and 3 ft. across. In the bottom of this vat are two square wooden pipes in the

Beet

tops of which are holes which are connected with a steam pipe. This steam pipe conveys the steam to the wooden pipes at a pressure of about 60 pounds to the sq. in. Between 1,200 and 1,800 pounds of wax is placed into the vat and enough water is run in to float it. The steam is then turned on and it jets up through the holes in the wooden pipes, melting the wax. The dirt in the wax falls to the bottom of the vat, and in about three hours after the steam is on, the wax is ready to be drawn off. The wax after passing through a sieve falls into a wooden roller about 5 ft. long and a foot and one-half in diameter which revolves in cool water. The wax clings to the roller and is carried around into the water. The roller turns once every second, and when the chilled beeswax is carried around into the cooler water it flies off the roller into the water bed. It is then lifted out by means of wooden forks, placed in boxes, and carried outside to the bleaching bed. These beds stand about 3 ft. above the ground and are about 100 ft. long, 15 ft. wide, and 1 ft. deep. The wax is spread out on these beds and allowed to remain for about 5 weeks exposed to the full light of the sun. The wax is sprinkled with water several times a day to prevent it from melting under the sun's rays, and each day it is harrowed with a rake so that all parts will be exposed to the sun several times. The wax is then a creamy white. It is taken back to the melting vats, remelted, run through a screen over a wooden roller, and brought back to the bleaching bed for another stay of about two weeks. By this time the wax is a pure white and is ready to be put into marketable shape. The wax is again melted and placed into pans and allowed to remain about an hour, when it is ready for the market.

Beet, a genus of plants, nat. order Chenopodiaceæ, distinguished by its fruit being enclosed in a tough woody or spongy five-lobed enlarged calyx. Two species only are known in general cultivation; namely, the sea beet and the garden beet.



Common Beet.

The former is a tough-rooted perennial, common on many parts of the British coast and sometimes cultivated for its leaves, which are an excellent substitute for spinach. Of the garden beet, which differs from the last in being of only biennial duration and in forming a tender fleshy root, two principal forms are known to cultivators, the chard beet and the common beet. In the chard beet the roots are small, white, and rather tough, and the leaves are furnished with a broad, fleshy midrib (*chard*), employed as a vegetable by the French, who dress the ribs like sea kale under the name of *poirée*. Some writers regard this as a peculiar species. The com-

Beet

mon beet includes all the fleshy-rooted varieties, such as red beet (with a fleshy large carrot shaped root), yellow beet, sugar beet, mangel-wurzel, etc. For garden purposes the best is the red beet of Castelnauary, so called from a town in the s. w. of France. The beet requires a rich light soil, and being a native of the Mediterranean region is impatient of severe cold, requiring to be taken up in the beginning of winter and packed in dry sand, or in pits like potatoes, the succulent leaves having been first removed. Red beet is principally used at table, but if eaten in great quantity is said to be injurious. The beet may be taken out of the ground for use about the end of August, but it does not attain its full size and perfection till the month of October. A good beer may be brewed from the beet, and it yields a spirit of good quality. From the white beet the French, during the wars with Napoleon I, succeeded in preparing sugar, that article, as British colonial produce, having been prohibited in France. Since that time, with the increase of chemical and technical knowledge, the making of beet-sugar has become an important industry in the U. S., France, Germany, Austria, Russia, Belgium, and Holland.

The process of making sugar from beets in the U. S. is substantially as follows: Beets are brought into the factory, dumped into long V-shaped trenches 10 to 20 ft. wide and 6 to 10 ft. deep. At the bottom of each of these is another ditch reaching downward with perpendicular sides 20 to 30 in. deep and having a curved bottom 18 in. wide. The sides and bottom are coated with cement, making a sort of flume through which water will flow. All the ditches slope toward the factory and meet near it in one large ditch. Before the beets are thrown into the larger and upper trench the smaller one is covered with boards to prevent the beets from falling into it, thus the beets are kept until needed. The object is to keep the beets without losing the sugar or blackening the juice. The beets when brought in have had the leaves cut off and most of the soil knocked off. When they are wanted in the factory a stream of water from an overhead flume is let into the upper end of the bottom ditch. The loose boards covering it are raised and the beets are allowed to fall into the swiftly running stream below and are floated along to the house. At the end of the ditch the beets are caught by buckets arranged along the rim of a large revolving wheel, lifted out of the water and discharged into a washing machine. From the washing machine they are discharged into an elevator which carries them to the very top of the building. Here they are discharged into an automatic weighing machine which weighs off half a ton at a time, registers, and drops the beets into the slicer. The slicer is a large wheel lying flatwise and carrying upon its flat surface corrugated knives, which in revolving under the beets cuts them into long, thin, diamond-shaped slices about $\frac{1}{4}$ in. wide and $\frac{1}{4}$ in. thick. Just below the slicer upon the

Beet

second floor of the factory is a circle of 12 to 14 wrought-iron tanks each capable of holding about one and one-half tons of slices. A revolving chute from the slicer fills each one in succession. Large pipes connect these together. The first is filled with slices, and water is let in from a tank above, which is allowed to stand while the second tank is filling. Then the valves are opened into the next tank containing fresh slices, and fresh water, running into the first tank under pressure, forces the water already containing some sugar on into the next tank, where it becomes richer, and so on from tank to tank, always tending to bring the sugar which is outside the little beet cells and that which is inside to a balance. As the water progresses it is raised in temperature by steam coils. After the water has gone through about ten tanks it contains about as much sugar as the beets, and is drawn off into a measuring tank. The slices in the first tank, which have by this time been supplied with fresh water eight or ten times, have lost all or nearly all their sugar. These exhausted slices are dropped from the tank and run through presses, and the pulp remaining is shipped away for cattle feeding. This apparatus is called the "diffusion battery," and when once started, fresh slices are supplied and juice is drawn off almost continuously. This juice contains much organic matter that is not sugar. It is run from the measuring tanks into tall cylindrical vessels which hold about 2,000 gallons each. To remove the coloring and other organic matter a thick milk of lime is added. Carbonic acid, which is heated to almost boiling by steam pipes, is passed into the liquid to free it from excess of lime. The juice is then forced by automatic pumps to the filter press, whence it comes quite clear and of a straw-yellow color. The lime pressed out in cakes forms one of the best land plasters that can be used. The juice is limed, carbonated, and filtered again and then goes to the evaporator. These are a series of four large tubular boilers supplied with the exhaust steam from the engine; each has a greater vacuum than the one before it, and the juice as it flows along from one to the next is evaporated rapidly and at a low temperature. As it comes from the last it is a moderately thick syrup, and when it has been filtered it is ready to be boiled down to sugar. The syrup is pumped up into the vacuum tanks. These are large cylindrical bodies ten feet in diameter with oval top and bottom. Inside are copper steam pipes coiled, and a large air pump with an 18-inch cylinder keeps up a high vacuum and removes the evaporated water, so that the boiling down goes on rapidly and at a low temperature. In the sides of the pan are glass windows through which the mass may be watched. When the grains begin to appear fresh syrup is added until they are of the required size, then the water is evaporated and the steam is shut off, the pump stopped, a valve is opened at the bottom of the pan, and the whole mass is allowed to run into the

Beetle

tanks below. The syrup is now dark and so thick that it will hardly run. It is drawn into large whirling drums which have their sides perforated with small holes and lined with brass gauze. As the drums revolve the sugar rises up along the sides, and the molasses is thrown out through the holes, while the sugar, too large to get through, remains sticking to the gauze. A spray of cold water and air is directed against the sugar to wash it, and a little bluing is added to give it brilliancy. The mill is stopped, and the sugar, now white and moist, is dropped from the bottom and conveyed to a large horizontal revolving cylinder, which is heated by steam and called the granulator. There the sugar is dried, and the fine dust of sugar contained in the granulator, is drawn out by a suction-blower. The sugar passes through screens at the end of the granulator and is then ready for market. The molasses which is thrown off through the small holes in the whirling drums, is mixed with fresh syrup and boiled again, or is boiled alone and passed through the drums, and the brown sugar resulting is refined by mixing with fresh syrup. Throughout the whole process a careful chemical control is maintained, and the material is tested at every stage.

Beethoven (bā'tō-vn), LUDWIG VON (1770-1827), a great German musical composer, b. at Bonn, studied under his father (a tenor singer), Pfeiffer, Van der Eden, and Neefe; began to publish in 1783; became assistant court organist in 1785; and was sent by the Elector of Cologne to Vienna in 1792, where he was the pupil of Haydn and Albrechtsberger, and acquired a high reputation for piano-forte extemporization before the merit of his written compositions was fully understood. In or near Vienna almost all his subsequent life was spent, his artistic tour in North Germany in 1796 being the most important break. He d. March 27, 1827. His later life was rendered somewhat morbid by his deafness, of which the first signs appeared in 1797. His best works were published after 1800, two periods being observable: the first from 1800 to 1814, comprising *Symphonies 2-8*; the opera *Fidelio* (originally *Leonore*), the music to Goethe's *Egmont*, and the overtures to *Prometheus*, *Coriolanus*, *King Stephen*, and *Fidelio*; the second (in which the poetic school of musicians find the germs of the subsequent development through Schumann, Wagner, and Liszt) comprising the *9th Symphony*, the *Missa Solemnis* and the *Sonatas*. Pl. 19, Vol. II.

Beetle, a name often used as synonymous with the term Coleoptera, but restricted by others to include all those insects that have their wings protected by hard cases or sheaths, called elytra. Beetles vary in size from a mere point to the bulk of a man's fist, the largest, the elephant beetle of South America, being 4 inches long. The so-called "black beetles" of kitchens and cellars are not properly beetles at all, but cockroaches, and of the order Orthoptera. One of the most celebrated beetles is the Sacred Scarabæus of Egypt. It

Begonia

is noted for the method in which it deposits its eggs. This beetle rolls its eggs up into small bits of cow-dung and rolls the ball along the ground in search of a spot sufficiently soft to allow her to excavate a place for the eggs. The mode of progress is very peculiar. She turns her back upon the ball, grasps it with her hind legs and works backward, pushing the ball along as a horse backs a cart.

Perhaps the largest and handsomest of the beetle race belongs to the Dynastes family. These beetles are large-bodied and stout-limbed, and reside in decaying vegetable matter, especially in rotten tree trunks or branches. They are of great service to the forest lands. Some are able to take a tree as soon as it is fallen and riddle the timber with their galleries. The rain penetrates these tunnels, lodges there, and thus decay sets in.

Bego'nia, an extensive genus of succulent-stemmed herbaceous plants, order Begoniaceæ, with fleshy, oblique leaves of various colors, and showy unisexual flowers, the whole perianth colored. They readily hybridize, and



Begonia.

many fine varieties have been raised from the tuberous-rooted kinds. From the shape of their leaves they have been called *elephant's ear*. Almost all plants of the order are tropical, and have mostly pink or red flowers.

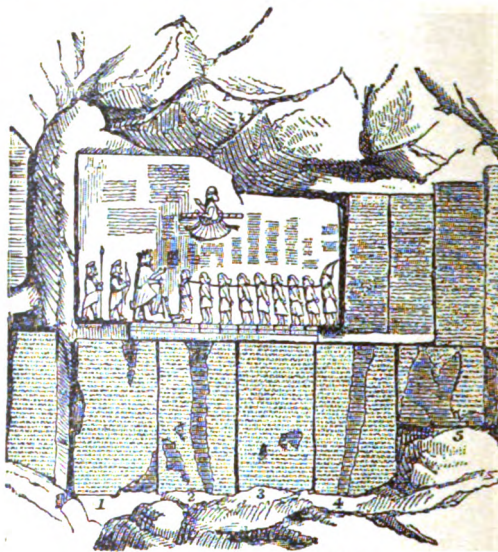
Behar', a prov. of Hindustan, in Bengal, area 44,139 sq. mi. Opium and indigo are largely produced. It is the most densely peopled prov. of India; pop. 23,127,104. Patna is the capital. The town of Behar, in the Patna district, contains some ancient mosques and the ruins of an old fort; it is a place of large trade. Pop. 48,968.

Behe'moth, the animal described in Job 40. The description is most applicable to the hippopotamus, and the word seems to be of Egyptian origin, and to signify "water ox," but it has been variously asserted to be the ox, the elephant, the crocodile, etc.

Behis'tun (or Bis'utan), a mountain near a village of the same name in Persian Kurdistan, celebrated for the sculptures and cuneiform inscriptions cut upon one of its sides—a rock rising almost perpendicularly to the height of 1,700 ft. These works, which stand

Behring

about 300 ft. from the ground, were executed by the orders of Darius I, king of Persia, and set forth his genealogy and victories. To receive the inscriptions, the rock was carefully



Rock Inscriptions at Behistun.

polished and coated with a hard, siliceous varnish. Their probable date is about 515 B.C. First copied and deciphered by Rawlinson.

Behring (or Bering) (bā'ring), VITUS (1680–1741), a famous navigator, b. at Horsens, Jutland. The courage displayed by him as captain in the navy of Peter the Great during the Swedish wars, led to his being chosen to command a voyage of discovery in the Sea of Kamtschatka. In 1728, and subsequently, he examined the coasts of Kamtschatka, Okhotsk, and the north of Siberia, ascertaining the relation between the northeastern Asiatic and northwestern American coasts. Returning from America in 1741, he was wrecked upon the desert island of Awatska (Bering's Island), and died there.

Behring's (or Bering) **Strait, Sea, and Island**.—The strait is the channel separating the continents of Asia and America, and connecting the North Pacific with the Arctic Ocean; breadth at the narrowest part, between Cape Prince of Wales and East Cape, about 36 mi.; depth in the middle from 29 to 30 fathoms. It is frozen in winter and seldom free from fog or haze. Though named after Vitus Bering, it was only fully explored by Cook in 1778. **BERING'S SEA**, sometimes called the Sea of Kamtschatka, is that portion of the North Pacific Ocean lying between the Aleutian Islands and Bering's Strait. **BERING'S ISLAND**, the most westerly of the Aleutian chain, off the east coast of Kamtschatka. It is uninhabited, and is without wood. A contention between the U. S. and Great Britain as to the capture of seals in Bering's Sea was referred by treaty to a court of arbitration in 1892, consisting of

Beira

seven persons, two representing the U. S., two representing Great Britain (one to be a Canadian), and one each from France, Sweden, and Italy. This court decided that the U. S. and Great Britain were each to prevent their subjects from killing or hunting seals within a radius of 60 mi. around the Pribilof Islands or in any part of the Pacific Ocean north of lat. 35° n. or e. of lon. 180° during the breeding season. The Pacific Ocean, according to the treaty of 1825, includes Bering Sea. The matter of damages was to be settled by diplomatic negotiations. In 1894 Secretary Gresham proposed to pay \$425,000 in full settlement of all damages, but Congress refused to ratify the agreement on the ground that the amount was excessive. It was later arranged that a tribunal consisting of one representative of the U. S. and one of Great Britain was to meet either at Victoria or San Francisco and award damages for seizures made. The president of the U. S. appointed a commission of scientists in 1896 to make investigation of the condition of fur seals of Alaska and report to Congress.

Beira (bā'i-rā), a province of Portugal. Area 9,248 sq. mi.; pop. 1,450,441. Chief town Coimbra. It is mountainous, and well watered, and productive of wine and olives. The heir apparent of the crown is styled Prince of Beira.

Bejapoor, a ruined city of Hindustan, in the Bombay presidency, near the borders of the Nizam's dominions, on an affluent of the Krishna. It was one of the largest cities in India until its capture by Aurungzebe in 1686. The ruins, of which some are in the richest style of Oriental art, are chiefly Mohammedan; the principal being Mahomet Shah's tomb, with a dome visible for 14 miles, and a Hindu temple in the earliest Brahmanical style. Pop. 16,759.

Bekes (bā'kāsh), a town, Hungary, at the junction of the Black and White Körös, with a trade in flax, cattle, corn, wine, etc. It is noted for bee culture. Pop. 24,561.

Bel (also belgar), the Hindu name of the Bengal quince. The fruit, which is not unlike an orange, is slightly astringent; a perfume and yellow dye are obtained from the rind, and a cement from the mucus of the seed.

Bel and the Dragon, a book of the Apocrypha, forming a sort of addition to the book of Daniel. In it Daniel is shown as exposing the imposture of the priests of Bel and killing a sacred dragon.

Belfast, Waldo co., Me., on Penobscot Bay, 30 mi. s.w. of Bangor. Railroad: Belfast & Moorehead line; steamboat line to Boston. Industries: iron foundry, two shoe factories, two sash and blind, ax, and bath-brush factories. Surrounding country agricultural and some granite quarries. The town was first settled in 1770 and became a city in 1853. Pop. 1900, 4,615.

Belfast, a seaport of Ireland, principal town of Ulster, and county town of Antrim. The chief educational institutions are the Queen's college, with about twenty professors, and the theological colleges of the Presbyteri-

Belgium

ans and Methodists. Belfast Lough is about 12 mi. long, and 6 mi. broad at the entrance, gradually narrowing as it approaches the town. The harbor and dock accommodation is now extensive, new docks having been recently added. Belfast is the center of the Irish linen trade, and has the majority of spinning mills and power-loom factories in Ireland. The iron ship-building trade is also of importance, and there are breweries, distilleries, flour mills, oil mills, foundries, print works, tan yards, chemical works, rope works, etc. The commerce is large. Belfast is comparatively a modern town, its prosperity dating from the introduction of the cotton trade in 1777. It has suffered severely at various times from faction fights between Catholics and Protestants, the more serious having been in the years 1864, 1872, and 1886. Pop. 255,950.

Belfort (or Belfort) (bā-för), a small fortified town and territory of France, in the former dep. Haut Rhin. Pop. 25,455. In the Franco-German War it capitulated to the Germans only after an investment of more than three months' duration (1870-71). It has since been greatly strengthened. Belfort, with the district immediately surrounding it, is the only part of the department of Haut Rhin which remained to France on the cession of Alsace to Germany. Area 234 sq. mi.; pop. 83,670.

Belgaum (bel-gaum), a town and fortress in Hindustan, Bombay presidency, district of Belgaum, on a plain 2,500 feet above the sea-level. In 1818 the fort and town were taken by the British, and from its healthy situation selected as a permanent military station. Pop. of town (including 7,921 for the cantonment), 40,737. The area of the district is 4,657 sq. mi., with a pop. of 1,013,261.

Belgium (bel'-jum), a European kingdom. Area 11,366 sq. mi. For administrative purposes it is divided into nine provinces: Antwerp, Brabant, East Flanders, West Flanders, Hainaut, Liège, Limburg, Luxembourg, and Namur. Pop. 6,262,272. Brabant, the metropolitan province, occupies the center. The capital is Brussels; other chief towns are Antwerp, Ghent, and Liège. The chief rivers are the Scheldt (or Schelde) and Meuse (or Maas); other navigable streams are the Dender, Dyle, Lys, Ourthe, Rupel, and Sambre. There are also a number of canals. The climate bears a considerable resemblance to that of the same latitudes in England; healthiest in Luxembourg and Namur, unhealthiest in the fens of Flanders and Antwerp. About one sixth of the whole surface of the kingdom is occupied by wood, Luxembourg and Namur being very densely wooded. These woods, the remains of the ancient forest of Ardennes, consist of hard wood, principally oak, and furnish valuable timber, besides many tons of bark both for the home tanneries and for exportation, and large quantities of charcoal. South Brabant also possesses several fine forests, among others that of Soignies; but in the other provinces the timber—mostly varieties of poplar—is grown in small copses and hedgerows.

About four fifths of the whole kingdom is

Belgium

under cultivation, and nearly eleven twelfths of it profitably occupied, leaving only about one twelfth waste. Flemish husbandry partakes more of the nature of garden than of field culture, being largely spade-farming. The chief corn crops are wheat, rye, and oats, but they do not suffice for the wants of the country. The chief green crops are potatoes, beets (partly for sugar), and flax, the last a most valuable crop in the Flemish rotation. The cattle are good and numerous. The horses of Flanders are admirably adapted for draught, and an infusion of their blood has contributed not a little to form the magnificent teams of the London draymen. The minerals of Belgium are highly valuable. They are almost entirely confined to the four provinces of Hainaut, Liège, Namur, and Luxemburg, and consist of iron and coal, lead, manganese, and zinc, the first two minerals being far the most important. The iron-working district lies between the Sambre and the Meuse, and also in the province of Liège. At present the largest quantity of oil is raised in that of Namur. The coal field has an area of above 500 sq. mi. The quantity of coal mined annually is about 18,000,000 tons. The export, chiefly to France, is over 5,000,000 tons, forming one of the largest and most valuable of all Belgian exports. Belgium is also abundantly supplied with building stone, pavement limestone, roofing-slate, and marble.

The industrial products of Belgium are very numerous, and are mostly of high character. The chief are those connected with linen, wool, cotton, metal, and leather goods. In respect of manufactures the fine linens of Flanders, and lace of South Brabant, are of European reputation. Scarcely less celebrated are the carpets and porcelain of Tournay, the cloth of Verviers, the extensive foundries, machine works, and other iron establishments of Liège. The commerce of Belgium is large and increasing. Apart from the value of her own products, she is admirably situated for the transit trade of Central Europe, to which her fine harbor of Antwerp and excellent railway and canal system minister. The external trade is chiefly carried on by means of foreign vessels. The total burden of the Belgian mercantile marine is only about 80,000 tons. The railways have a total length of 2,800 miles, about three fourths belonging to the state.

The Belgian population is the densest of any European state (508 per sq. mi.), and is composed of two distinct races—Flemish, who are of German, and Walloons, who are of French extraction. The former, by far the more numerous, have their principal locality in Flanders; but also prevail throughout Antwerp, Limburg, and part of South Brabant. The latter are found chiefly in Hainaut, Liège, Namur, and part of Luxemburg. The Flemings speak a dialect of German, and the Walloons a corruption of French, with a considerable infusion of words and phrases from Spanish and other languages. French is the official and literary language, though Flemish is also successfully employed in literature.

Belgium

Improved means of education are now at the disposal of the people, every commune being bound to maintain at least one school for elementary education, the government paying one sixth, the province one sixth, and the commune the remainder of the expenditure. In all the large towns colleges have been established; while a complete course for the learned professions is provided by four universities, two of them, at Ghent and Liège, established and supported by the state; one at Brussels, the free university, founded by voluntary association; and one at Louvain, the Catholic university, founded by the clergy. By the Belgian constitution the executive power is vested in a hereditary king; the legislative, in the king and two chambers—the senate and the chamber of representatives—both elected by citizens paying direct taxes, the former for eight years, and the latter for four, but one half of the former renewable every four years, and one half of the latter every two years. Each of the provinces is administered by a governor and is subdivided into *arrondissements administratifs* and *arrondissements judiciaires*; subdivided again, respectively, into *cantons de milice* and *cantons de justice de paix*. Each canton is composed of several communes, of which the sum total is 2,514. The army is formed by conscription, to which every able man who has completed his nineteenth year is liable, and also by voluntary enlistment. The peace strength is 48,841 officers and men; in time of war 154,780. Besides this standing army there is a *garde civique* numbering 43,647 active and 90,000 non-active men. The navy is confined to a few steamers and a small flotilla of gunboats. The coins, weights, and measures are the same, both in name and value, as those of France.

History.—The territory now known as Belgium originally formed only a section of that known to Cæsar as the territory of the Belgæ, extending from the right bank of the Seine to the left bank of the Rhine, and to the ocean. This district continued under Roman sway till the decline of the empire; subsequently formed part of the kingdom of Clovis; and then of that of Charlemagne, whose ancestors belonged to Landen and Herstal on the confines of the Ardennes. After the breaking up of the empire of Charlemagne Belgium formed part of the kingdom of Lotharingia under Charlemagne's grandson, Lothaire; Artois and Flanders, however, belonging to France by the treaty of Verdun. For more than a century this kingdom was contended for by the kings of France and the emperors of Germany. In 953 it was conferred by the Emperor Otto upon Bruno, archbishop of Cologne, who assumed the title of archduke, and divided it into two duchies, Upper and Lower Lorraine. In the frequent struggles which took place during the eleventh century Luxemburg, Namur, Hainaut, and Liège usually sided with France, while Brabant, Holland, and Flanders commonly took the side of Germany. The contest between the civic and industrial organizations and feudalism, which went on through the twelfth and thirteenth centuries, and in which Flanders

bore a leading part, was temporarily closed by the defeat of the Ghentese under Van Artevelde in 1382. In 1384 Flanders and Artois fell to the house of Burgundy, which in less than a century acquired the whole of the Netherlands. The death of Charles the Bold at Nancy, in his attempt to raise the duchy into a kingdom (1477), was followed by the succession and marriage of his daughter, Mary of Burgundy, by which the Netherlands became an Austrian possession. With the accession, of Charles of Hapsburg (the future Emperor Charles V), grandson of Mary and Maximilian, to the throne of Spain in 1516, the Netherlands were united with that kingdom, and in 1549 their formal union with the Spanish crown was decreed. Under Philip, Charles' son, a long war was begun which lasted over forty years and ended in the independence of the northern or Dutch Netherlands, while in the southern provinces (modern Belgium) the sovereignty of Spain continued.

From 1598 to 1621 the Spanish Netherlands were transferred as an independent kingdom to the Austrian branch of the family by the marriage of Isabella, daughter of Philip II, with the Archduke Albert of Austria. He died childless, however, and they reverted to Spain. After being twice conquered by Louis XIV, conquered again by Marlborough, coveted by all the powers, deprived of territory on the one side by Holland and on the other by France, the southern Netherlands were at length, in 1714, by the peace of Utrecht, again placed under the dominion of Austria, with the name of the Austrian Netherlands. During the Austrian War of Succession the French under Saxe conquered nearly the whole country, but restored it in 1748 by the peace of Aix-la-Chapelle. On the succession of Joseph II, the "philosophic emperor," a serious insurrection occurred, the Austrian army being defeated at Turnhout, and the provinces forming themselves into an independent state as United Belgium (1790). They had scarcely been subdued again by Austria before they were conquered by the revolutionary armies of France, and the country divided into French departments, the Austrian rule being practically closed by the battle of Fleurus (1794), and the French possession confirmed by the treaties of Campo Formio (1797) and Lunéville (1801).

In 1815 Belgium was united by the Congress of Vienna to Holland, both countries together now forming one state, the Kingdom of the Netherlands. This union lasted till 1830, when a revolt broke out among the Belgians, and soon attained such dimensions that the Dutch troops were unable to repress it. A convention of the great powers assembled in London, favored the separation of the two countries, and drew up a treaty to regulate it; the National Congress of Belgium offering the crown, on the recommendation of England, to Leopold, prince of Saxe-Coburg, who acceded to it under the title of Leopold I, on July 21, 1831. In November of the same year the five powers guaranteed the crown to him by the

treaty of London, and the remaining difficulties with Holland were settled in 1839, when the Dutch claims to territory in Limburg and Luxemburg were withdrawn. The reign of Leopold was for Belgium a prosperous period of thirty-four years. Leopold II succeeded his father in 1865. In 1885, on the constitution by the Congress of Berlin of the Congo Free State, in which Leopold II had shown an active interest, he was invited to become its sovereign, and has since held that title. By a will executed in 1889, Leopold bequeaths his new dominions to the Belgian State. Under Leopold Belgium has prospered and enjoyed peace, disturbed only by the labor and socialistic troubles common in manufacturing countries of the present day. In 1899, a law was passed according to which every party is represented in the Chamber of Deputies in the proportion of its vote to the total poll. In 1902, an army bill was enacted providing for voluntary enlistment. Pop. 1901, 6,744,532.

Belgrade (bel-grad'), capital of Servia. It manufactures carpets, silk stuffs, hardware, cutlery, and saddlery, and carries on an active trade. Being the key of Hungary, it was long an object of fierce contention between the Austrians and the Turks, remaining, however, for the most part in the hands of the Turks until its evacuation by them in 1867. Since the treaty of Berlin (July, 1878) it has been the capital of an independent state. Pop. 54-763.

Be'lial, a word which by the translators of the English Bible is often treated as a proper name, as in the expressions, *son of Belial*, *man of Belial*. In the Old Testament, however, it ought not to be taken as a proper name, but it should be translated *wickedness* or *worthlessness*. To the later Jews Belial seems to have become what Pluto was to the Greeks, the name of the ruler of the infernal regions; and in 2 Cor. 6:15 it seems to be used as a name of Satan, as the personification of all that is bad.

Belisa'rius (505-565), the general to whom the Emperor Justinian chiefly owed the splendor of his reign; b. in Illyria about 505 A. D. He obtained the chief command of an army on the Persian frontiers, and in 530 gained a victory over a superior Persian army. In the year 532 he checked the disorders in Constantinople. He took Carthage and led Gelimer, the Vandal king, in triumph through Constantinople. He stormed Naples, held Rome for a year, took Ravenna, and led captive Vitiges, the Gothic king.

Belize (be-lez'), the capital and only trading port of British Honduras, situated at the mouth of the southern arm of the river Belize. Exports: chiefly mahogany, rosewood, logwood, cedar, cocoa-nuts, and sugar. Pop. about 5,800.

Bell, a hollow, somewhat cup-shaped, sounding instrument of metal. The metal from which bells are usually made (by founding) is an alloy, called bell-metal, commonly composed of eighty parts of copper and twenty of tin. The proportion of tin varies, however, from one third to one fifth of the weight of the copper, ac-

Bell

cording to the sound required, the size of the bell, and the impulse to be given. The clearness and richness of the tone depend upon the metal used, the perfection of its casting, and also upon its shape; it having been shown by a number of experiments that the well-known shape with a thick lip is the best adapted to give a perfect sound. The depth of a tone of a bell increases in proportion to its size. A bell is divided into the *body or barrel*, the *ear* or *cannon*, and the *clapper or tongue*. The *lip* or *sound-bow* is that part where the bell is struck by the clapper.



Ancient Crotal.

It is uncertain whether the jangling instruments used by the Egyptians and Israelites can be correctly described as bells; but it is certain that bells of a considerable size were in early use in China and Japan, and that the Greeks and Romans used them for various purposes. They are said to have been first introduced into Christian churches about 400 A. D. by Paulinus, bishop of Nola, in Campania (whence *campana* and *nola* as old names of bells), although their adoption on a wide scale does not become apparent until after the year 550, when they were introduced into France. Benedict Biscop, abbot of Wearmouth, seems to have imported bells from Italy to England in 680, but their use in Ireland and Scotland is probably of earlier date. The oldest of those existing in Great Britain and Ireland, such as the "bell of St. Patrick's will" and St. Ninian's bell, are quadrangular and made of thin iron plates hammered and riveted together. Until the thirteenth century they were of comparatively small size, but after the casting of the Jacqueline of Paris (6½ tons) in 1400, their weight rapidly increased. Among the more famous bells are the bell of Cologne, 11 tons, 1448; of Dantzic, 6 tons, 1453; of Halberstadt, 7½, 1457; of Rouen, 16, 1501; of Breslau, 11, 1507; of Lucerne, 7½, 1636; of Oxford, 7½, 1680; of Paris, 12½, 1680; of Bruges, 10½, 1680; of Vienna, 17½, 1711; of Moscow (the monarch of bells), 193, 1736; three other bells at Moscow ranging



Queen Mary's Hand Bell from 16 to 31 tons, and a fourth, of 80 tons, cast in 1819; the bell of Lincoln (Great Tom), 5½, 1834; of York Minster (Great Peter), 10½, 1845; of Montreal, 13½, 1847, the largest bell in America; of Westminster (Big Ben), 15½, 1856; (St. Stephen), 13½, 1858; the Great Bell of St. Paul's, 17½, 1882. Others are the bells of Ghent (5), Görlitz (10½), St. Peter's, Rome (8), Antwerp (7½), Olmutz (18), Brussels (½), Novgorod (31), Peking (53½).

Bell

Besides their use in churches bells are employed for various purposes, the most common use being to summon attendants or domestics in private houses, hotels, etc. Bells for this purpose are of small size and may be held in the hand and rung, but most commonly are rung by means of wires stretched from the various apartments to the place where the bells are hung. Bells rung by electricity are now becoming common in hotels and other establishments.

Bells, as the term is used on shipboard, are the strokes of the ship's bell that proclaim the hours. Eight bells, the highest number, are rung at noon and every fourth hour afterward; *i. e.*, at 4, 8, 12 o'clock, and so on. The intermediary periods are indicated thus: 12:30, 1 bell; 1 o'clock, 2 bells; 1:30, 3 bells, etc., until the eight bells announce 4 o'clock, when the series recommences: 4:30, 1 bell; 5 o'clock, 2 bells, etc. The even numbers of strokes thus always announce hours, the odd numbers half-hours.

The manufacture of a bell is a difficult and interesting process, and the success of a bell depends in the first place on the amount of accuracy with which its dimensions have been figured out beforehand. The thickness of the bell's edge must bear a certain proportion to its diameter and height. It must also be of just the right thickness in its various parts. There are exact rules for calculating the dimensions and the proportions of the metal to the size of the bell. Copper and tin are used for large bells, but the mixture varies widely. About four parts of copper are used with each part of tin. When the design has been made for a bell it goes to a pattern maker. This workman cuts out two long strips of wood, one of them just the contour of the inside of the projected bell and the other the contour of the outside. A basin for the mold is made in the foundry. It is constructed in the earth and consists mainly of fire brick and clay, a stout post perfectly plumb is planted in the center and is of the same height as the proposed bell. The two contour pieces are pivoted to the post so that they will swing around in either direction. In the center of the basin and around the post is built a little furnace of brick so large that it almost reaches the sweep of the inside of the contour leg of the compass. It is then pieced out on top with fire clay until it exactly conforms to the sweep of the contour pieces. It is made very smooth and is allowed to harden. This forms a core. Then grease is applied, then more clay, until it reaches and is swept smooth by the upper contour leg. This covering of clay is exactly the size and shape of the projected bell. If there are to be any designs or inscriptions on the bell they are worked in in reverse order and plugged in with wax. When it is dry it is smeared with grease and another layer of clay, called a mantle, which is packed on roughly, a hole being left in the top through which the molten metal can be poured. After this has hardened, the whole mass is shaped by building a hot fire in the interior furnace. The wax in the inscrip-

Bell

tions and the grease vaporize and pass off. The mantle, or the mold for the outer part of the bell, can now be easily lifted off. When the next layer of clay is removed and the mantle replaced, the space left between it and the core furnishes the bell mold. The great mass of bell metal is brought from the furnace and poured into the mold. Small pieces of broken bells are thrown into the crucible to cool the metal. When the mold is full the pouring is complete. The mold is left for several weeks to grow cool and shrink because if it were broken open at once the bell would cool more rapidly on the outside than on the inside and would break. When the mold is taken off, the bell is tested and if it gives out a single pure tone it is regarded as a perfect cast. If the tone is not pure the bell can sometimes be tuned by filing away parts of the inside surface.

Bell, ALEX. GRAHAM, a noted physicist, b. in Edinburgh, 1847. He was trained in his father's system of removing impediments of speech, in the university of Edinburgh, and matriculated 1867, at London university, but left on account of failing health. He removed to Canada, 1870, where he designed and partly constructed the telephone exhibited in Philadelphia, 1876. His residence had been in Boston from 1872, being professor of Vocal Physiology at Boston university. His fame and fortune are due to the commercial importance of the telephone of which he holds the patent. Elisha Gray filed his caveat in the patent office two hours after Bell's application. After Bell, a large number of experimenters appeared, suggesting endless modification but no essentially new principle. In a lecture delivered by Reis in Frankfort, in the year 1861, an apparatus was described which has given rise to much discussion concerning priority of invention.

The *Photophone*, the joint work of Bell and Taintor, in which a vibratory beam of light is substituted for a wire in conveying speech, was introduced to the public, 1880. In 1881 Bell and Taintor, with an improved form of Hughes's induction balance, attempted unsuccessfully to locate the ball which caused Garfield's death. Another interesting experiment of Bell's was attempting to record speech by photographing the vibrations of a jet of water. Bell resides in Washington and is a member of many learned societies. He introduced into the U. S. his father's system of educating deaf mutes. Plate 25, Vol. III.

Bell, HENRY (1767-1830), the first successful applier of steam to the purposes of navigation in Europe, was born in Linlithgowshire. In 1798 he turned his attention specially to the steamboat, the practicability of steam navigation having been already demonstrated. In 1812 the *Comet*, a small thirty-ton vessel built at Glasgow under Bell's direction, and driven by a three horse-power engine made by himself, commenced to ply between Glasgow and Greenock, and continued to run till she was wrecked in 1820. This was the beginning of steam navigation in Europe. Bell is also cred-

Belladonna Lily

ited with the invention of the "discharging machine" used by calico-printers.

Bell, JOHN (1797-1869), born near Nashville, Tenn. He was graduated at what is now the university of Nashville in 1814, was admitted to the bar in 1816, and was elected to the state senate in 1817. He served in Congress as a Whig, 1827-41, winning reputation as a debater. He became an ardent supporter of the protective tariff. He supported General Jackson as candidate for the Presidency in 1832. In 1834 he was elected speaker of the House of Representatives. He favored the reception of petitions for the abolition of slavery in the District of Columbia. In 1841 he was appointed secretary of war by President Harrison. He was in the U. S. Senate 1849-59. He opposed the Texas annexation policy, advocated Henry Clay's compromise of 1850, voted against the Kansas-Nebraska bill of 1850, and opposed the repeal of the Missouri Compromise. Mr. Bell was nominated for President, with Edward Everett for Vice-President, by a convention of the "Constitutional Union" in 1860, when secession was threatened by the Southern States, and he received the electoral votes of Tennessee, Virginia, and Kentucky. He, with seven other citizens of Tennessee, issued an address recommending his state to preserve an armed neutrality in 1861, and on April 23, 1861, he delivered an address in Nashville in support of the Southern policy. Mr. Bell did not serve in the Civil War.

Belladonna, a European plant, the deadly nightshade. It is native in Britain. All the parts of the plant are poisonous, and the incautious eating of the berries has often produced death. The inspissated juice is commonly known by the name of extract of belladonna. It is narcotic and poisonous, but is of great value in medicine, especially in nervous ailments. It has the property of causing the pupil of the eye to dilate. The fruit of the plant is a dark, brownish-black, shining berry. The name signifies "beautiful lady," and is said to have been given from the use of the plant as a cosmetic.

Belladonna Lily, so called on account of its beauty, with delicate blushing flowers clus-



Belladonna. a.—flower, b.—fruit.

Bellaire

tered at the top of a leafless flowering stem. It is a native of the Cape of Good Hope and of the West Indies.

Bellaire, city in Belmont co., O., on the Ohio river, 5 m. s. of Wheeling, W. Va., and on the B. & O., the Pennsylvania, and several other railroads. Coal, iron, cement, paving brick clays and limestone are abundant in the surrounding country. The city has extensive manufactures of glass, steel, iron, nails, and farm implements. It has water and gas works and electric lights. Pop. 1900, 9,912.

Bellamy, EDWARD, b. in Massachusetts, 1850; was admitted to the bar in 1871. He was connected with the Springfield, Mass., and New York press, and in 1888 published *Looking Backward*, a dream of perfect socialism. D. 1898.

Bellary (bel-ā'ri), a town in India, presidency of Madras, capital of a district of the same name, 280 mi. n. w. of Madras; a military station, with a fort crowning a lofty rock, and other fortifications. Pop. 59,467. The district was ceded to the British in 1800. Area 5,975 sq. mi; pop. 900,126.

Bell-bird, the name given to a South American passerine bird, so named from its sonorous, bell-like notes; and also to a bird of Australia, a bird of the family Meliphagidæ (honey-suckers), whose notes also resemble the sound of a bell.

Bell-crank, in machinery, a rectangular lever by which the direction of motion is changed through an angle of 90°, and by which its velocity ratio and range may be altered at pleasure by making the arms of different lengths. It is much employed in machinery, and is named from its being the form of crank employed in changing the direction of the bell wires of house bells.

Bell-Alliance, a farm 13 mi. s. of Brussels, famous as the position occupied by the center of the French Army in the battle of Waterloo, June, 1815.

Belle-Isle (bel-ēl) (or Belle-Isle-en-Mer), a French Island in the Bay of Biscay, dep. of Morbihan, 8 mi. s. of Quiberon Point; length 11 mi.; greatest breadth 6 mi. Pop. 10,000,177, largely engaged in the pilchard fishing. The capital is Le Palais on the n. e. coast.

Belle-Isle (bel-il), a rocky island, 9 mi. long, at the eastern entrance to the Strait of Belle-Isle, the channel, 15 mi. wide, between Newfoundland and the coast of Labrador. Steamers from Glasgow and Liverpool to Quebec round the north of Ireland commonly go by this channel in summer as being the shortest route.

Beller'ophon (or Hippon'oūs), in Greek mythology, a hero who, having accidentally killed his brother, fled to Prætus, king of Argos, whose wife, Antæa, fell in love with him.

Belles-lettres (bel-let-r), polite or elegant literature; a word of somewhat vague signification. Rhetoric, poetry, fiction, history, and criticism, with the languages in which the standard works in these departments are written, are generally understood to come under the head of *belles-lettres*.

Belleville, St. Clair co., Ill., on Richland

Bel lows

Creek, 14 mi. s. e. of St. Louis. Railroads: Illinois Central; L. & N.; L. E. & St. L.; St. L. B. & S. Industries: nail mills, four flouring mills, four iron foundries, machine shops, keg, clothing, and glass factories, and four farm implement factories. Surrounding country agricultural and mineral. The town was first settled in 1814 and became a city in 1850. Pop. 1900, 17,484.

Belleville, a town of Canada, prov. Ontario, capital of Hastings co., on the Bay of Quinté, at the mouth of the Moira, with flourishing trade and manufactures. It is rather a fine town, and has a Methodist Episcopal university for men and women (two colleges). Pop. 10,100.

Bellini (bel-ē-nē), JACOPO, and his two sons, GENTILE and GIOVANNI, the founders of the Venetian school of painting. The father excelled in portraits, but very little of his work is extant. He d. about 1470. Gentile was b. in 1421, and in 1479 went to Constantinople, Mohammed II having sent to Venice for a skillful painter; d. at Venice in 1501. Giovanni was b. about 1424, and d. about 1516. He contributed much to make oil-painting popular, and has left many noteworthy pictures. Titian and Giorgione were among his pupils.

Bellini (bel-ē'nē), VINCENZO (1802-1835), a celebrated composer, b. at Catania in Sicily. He was educated at Naples under Zingarelli, commenced writing operas before he was twenty, and composed for the principal musical establishments in Europe. His most celebrated works are *I Montecchi e Capuleti* (1829); *La Sonnambula* (1831); *Norma*, his best and most popular opera; and *I Puritani* (1834).

Bellmann, KARL MICKEL (1740-1795), the most original among the Swedish lyric poets. His songs, in which love and liquor are common themes, are sung over the whole country, and "Bellmann" societies hold an annual festival in his honor.

Bello'na, the goddess of war among the Romans, often confounded with Minerva. She was the sister of Mars, or, according to some, his daughter or his wife. She is described by the poets as armed with a bloody scourge, her hair disheveled, and a torch in her hand.

Bel'lows, an instrument or machine for producing a strong current of air, and principally used for blowing fires, either in private dwellings or in forges, furnaces, mines, etc. It is so formed as, by being dilated and contracted, to inhale air by an orifice which is opened and closed with a valve, and to propel it through a tube upon the fire. It is an ancient contrivance, being known in Egypt, India, and China many ages ago, while forms of it are used among savage tribes in Africa. Bellows of very great power are called blowing machines, and are worked by machinery driven by steam. The blowing machines now almost exclusively used for blast furnaces are of the cylinder and piston type. At first the blowing cylinders had the power of propelling a blast only when the piston was moving in one direction. The cylinder engines of the present day

Bellows-fish

may be classed in two chief systems, according as the cylinder is placed horizontally or vertically. In the former case the steam and blast cylinders are usually in one line, the same rod carrying the pistons of both, and being guided on both sides, while a fly-wheel is employed as regulator. In the vertical systems the steam and blowing cylinders are sometimes similarly connected, but in the larger engines, they are generally placed one at each end of a beam connecting their pistons. Another kind of blowing engine consists of a barrel-shaped vessel supported horizontally by the two ends of its axis. The cylinder is divided longitudinally by a plane extending from the middle of the internal surface above (the barrel being in its position of rest) to near the opposite side. Suppose the cylinder partly filled with water and made to turn a little way round on its axis, the air on one side will be compressed by the water, while that on the other will be rarefied. A valve opening outward from the condensed side admits the air to a cavity from which a nozzle pipe proceeds, while a valve opening inward on the rarefied side admits external air. With additional and corresponding valves the process is repeated on the reverse oscillation of the cylinder. Thus by swinging the cylinder from side to side, by a crank and rod connected with the engine, alternate puffs of air are propelled into a regulative air chest of special construction, which then supplies a steady blast.

Fan-blast machines are frequently employed in the cupola furnaces where anthracite is burned. In one common form the fan consists of four spokes of a rimless wheel, tipped with vanes and made to rotate in a cylindrical chest, in which it has often a slightly eccentric position. There are openings on both sides round the spindle for admission of air, which, sucked in by the centrifugal action of the fan as it quickly rotates, flows toward the vanes, and is driven through an exit pipe attached to another part of the cylinder. A new form of blower has a chamber in which three drums of equal size are enclosed, two in a line below and one above; the upper one is provided with wings, and the two lower have wide slots along their entire length, allowing the wings to enter in the course of rotation. The function of the two lower drums is to supply alternately abutments to prevent the escape of the air. They are caused to revolve in proper relation with the motion of the upper drum by spur-wheels on the journals, which mesh into another spur-wheel on the shaft of the upper drum. In the moving parts of this machine there are no parts that come into actual contact except the teeth of the spur-wheels.

Bellows-fish, a fish, called also the Trumpet-fish or Sea-snipe. It is not uncommon in the Mediterranean. It is 4 or 5 inches long, and has an oblong oval body and a tubular elongated snout, which is adapted for drawing from among sea-weed and mud the minute crustacea on which it feeds.

Bell Rock (or inch cape), a dangerous reef surmounted by a lighthouse, situated in the

Belt

German Ocean about 12 mi. from Arbroath, nearly opposite the mouth of the river Tay. The lighthouse was erected in 1808-11 by Robert Stevenson from Rennie's plan at a cost of upward of \$300,000. It rises to a height of 120 feet; has a revolving light showing alternately red and white every minute, and visible for upward of 15 mi. It also contains two bells which are rung during thick weather. The reef is partly uncovered at ebb-tides.

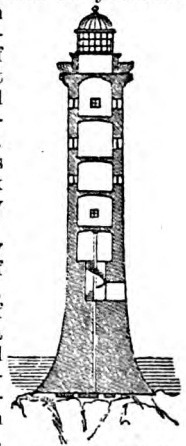
Belluno (bel-lō'nō), a city of Northern Italy, capital of a province of the same name, on the Piave, 48 mi. n. of Venice. Has a cathedral, a handsome theater, etc.; and manufactures of silk, straw-plait, leather, etc. Pop. 16,000. The province has an area of 1,271 sq. mi. and a pop. of 195,419.

Beloit, Rock co., Wis., 69 mi. s.w. of Milwaukee, the seat of Beloit college; various factories. Pop. 1900, 10,436.

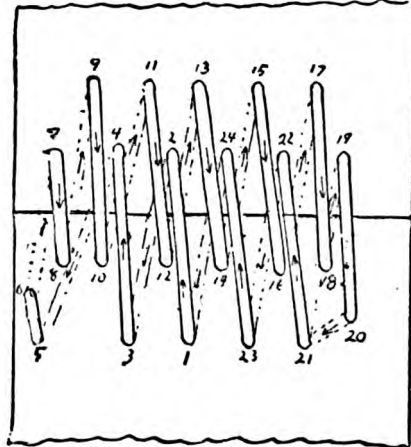
Bel'per, a town, England, Derbyshire, in a valley, on the Derwent, 7 mi. n. of Derby, with large cotton mills, foundries, etc., and in the neighborhood numerous collieries. Pop. 10,420.

Belshaz'zar, the last of the Babylonian kings, who reigned conjointly with his father, Nabonadius. He perished B. C. 538, during the successful storming of Babylon by Cyrus. This event is recorded in the book of Daniel.

Belt, belting, a flexible endless band, or its material, used to transmit motion or power from one wheel, roller, or pulley to another,



Section of Bell Rock Lighthouse.



Belt Lacing.

and common in various kinds of machinery. Driving belts are usually made of leather or india-rubber, or some woven material, but ropes and chains are also used for the same purpose.

Belt

There are a number of ways of lacing a belt, but every machinist has his own favorite method. One rather complex but effective method is to punch 24 holes, 13 on one side and 11 on the other side, as shown in cut. The lace is doubled in the center of its length and run through the middle hole (13) of the second row on that side of the joint which contains 11 holes. The lace is passed over and under from side to side, bringing both ends of the lace out of the middle hole (1), and there the ends are tied on the outside of the belt. By this means there is no crossing of the lace on either side, and there can be no side play and the lace will not creep. When a light belt is called upon to do little work, it is customary to lace the belt shoe-string fashion, back and forth through single rows of holes, always beginning the lacing in the center of the belt. Imperfectly adjusted belting is a fruitful cause of power waste, and a poorly laced joint is the principal cause of loss of transmitted energy. If a lace be crossed on the under side the belt is raised from the pulley every time the joint comes around, and not only is the power wasted, but the lace is soon worn through. Sometimes the lace on the other side is covered by a piece of belting, scraped thin and cemented to the joint. In many cases the ends of the belt are scarfed, the laps cemented together and the whole strengthened by rivets. For lacing wide belts which are too heavy to be stretched by hand, the stretching clamp is used. This holds the ends firmly until the belt is laced.

Belt, The Great and Little, two straits connecting the Baltic with the Cattegat, the former between the islands of Zealand and Funen, about 18 mi. in average width; the latter between Funen and the coast of Schleswig, at its narrowest part not more than a mile in width.

Bel tane, a sort of festival formerly observed in Ireland and Scotland, and still kept up in a fashion in some remote parts. It is celebrated in Scotland on the first day of May usually by kindling fires on the hills and eminences. In early times it was compulsory on all to have their domestic fires extinguished before the Beltane fires were lighted, and it was customary to rekindle the former from the embers of the latter. This custom no doubt derived its origin from the worship of the sun.

Belton, Bell co., Tex., 55 mi. n.e. of Austin, the seat of the Chamberlain institute; two banks, and a Masonic temple. Pop. 3,700.

Beluga (be-lö'ga), a kind of whale or dolphin, the white whale or white fish, found in the northern seas of both hemispheres. It is from 12 to 18 feet in length, and is pursued for its oil (classed as "porpoise oil") and skin. In swimming the animal bends its tail under its body like a lobster, and thrusts itself along with the rapidity of an arrow. A variety of sturgeon found in the Caspian and Black Seas is also called beluga.

Belzo'ni, GIOVANNI BATTISTA (1778-1823) (John Baptistini), an enterprising traveler, was b. at Padua. In 1803 he emigrated to Eng-

Benedictine

land. In 1815 he visited Egypt, where he made a hydraulic machine for Mehemet Ali. He then devoted himself to the exploration of the antiquities of the country. He succeeded in transporting the bust of Memnon (Rameses II) from Thebes to Alexandria, from whence it came to the British Museum; explored the great temple of Rameses II at Abu-Simbel; opened the tomb of Seti I, from which he obtained the splendid alabaster sarcophagus bought by Sir John Soane for \$10,000, and he also succeeded in opening the second of the pyramids of Ghizeh.

Bembecidæ (-bes'i-dē), a family of wasp-like insects with stings, mostly natives of warm countries, and known also as sand-wasps. The female excavates cells in the sand, in which she deposits, together with her eggs, various larvæ or perfect insects stung into insensibility, so as to furnish support for her progeny when hatched. They are very active, fond of the nectar of flowers, and delight in sunshine. *Bembex* is the typical genus of this family.

Ben, oil of, the expressed oil of the bennut, the seed of the ben or horse-radish tree of India. The oil is inodorous, does not become rancid for many years, and is used by perfumers and watchmakers.

Benares (be-nā'rez), a town in Hindustan, Northwest Provinces, administrative headquarters of a district and division of the same name, on the left bank of the Ganges, from which it rises like an amphitheater, presenting a panorama of temples, mosques, palaces, and other buildings. It is the headquarters of the Hindu religion. Benares carries on a large trade in the produce of the district and manufactures silks, shawls, embroidered cloth, jewelry, etc. The population, including the neighboring cantonments at Sikraul (Secrole), 229,467. The district has an area of 1,009 sq. mi., and a pop. of 921,943.

Bencoo'len, a seaport of Sumatra, on the s. w. coast. The English settled here in 1685, and retained the place and its connected territory till 1825, when they were ceded to the Dutch in exchange for the settlements on the Malay Peninsula; since then Bencoolen has greatly declined. Pop. 15,000.

Bender', a town and fortress of Russia, in Bessarabia, on the Dniester. Its commerce is important, and it carries on some branches of manufacture. Pop. 24,625.

Ben'edict, the name of fourteen popes from 574 to 1758.

Benedict, SIR JULIUS (1804-1885), pianist and composer, b. at Stuttgart, d. at London. He took up his residence in England in 1835, and was knighted in 1871. Principal works: the operas of *The Gypsy's Warning*, *Undine*, *St. Cecilia*, *Lily of Killarney*, and *Graziella*.

Benedic'tine, a liquor prepared by the Benedictine monks of the abbey of Fécamp, in Normandy, France, consisting of spirit (fine brandy) containing an infusion of the juices of plants, and said to possess digestive, antispasmodic, and other virtues, and to have

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